



# interactive computing directories

## CONTENTS AND FILING INSTRUCTIONS

UPDATE NUMBER: 22

DATE: September, 1979

INDEX TAB		CURRENT CONTENTS	CURRENT ACTION
VOL. 1	CONTENTS	This page	Replace previous contents page with this page in Vol. 1 behind index tab.
	APPLICATIONS DIRECTORY	Directory Entry Index (single page)	None
	COMPANY DIRECTORY	A. COMPANY PROFILES AND SECURITY PRECAUTIONS (pages A.000 through A.490)	None
	GEOGRAPHIC DIRECTORY	XX. GEOGRAPHIC DIRECTORY (pages XX.000 through XX.108)	Remove the entire old section and insert the enclosed new section.
	ATSU NEWSLETTERS	ATSU Newsletters and Press Reviews	Insert the September/October issue and Press Review in this section.
	SPECIAL REPORTS	1. Making a Vendor Decision 2. Comparative Analysis of Financial Reporting and Modeling Systems (5/78)	None
	OTHER DOCUMENTS	1. Guidelines for ATSU's Compliance with the Federal Anti-Trust Laws	None
	ASSOCIATION BY-LAWS	1. Articles of Incorporation 2. Synopsis of By-Laws 3. By-Laws	None
VOL. 2	FINANCIAL MODELING LANGUAGES	I. Financial Modeling Languages (pages I.000 through I.680)	Remove old page I.000 and insert new pages I.000 and I.510.
	INTERACTIVE DATA-BASE SYSTEMS	II. Interactive Data-Base Systems (pages II.000 through II.640)	None
	INTERACTIVE STATISTICAL PACKAGES	III. Interactive Statistical Packages (pages III.000 through III.440)	None
	INTERACTIVE GRAPHICS PROGRAMS	IV. Interactive Graphics Programs (pages IV.000 through IV.401)	None
	DATA-BASES AVAILABLE	V. Data-Bases Available to Users (pages V.000 through V.461)	Remove old pages V.001 and V.060 and insert new pages V.001, V.060 and V.270.
	MANAGEMENT SCIENCES PROGRAMS	VI. Management Sciences Programs (pages VI.000 through VI.281)	Remove old page VI.000 and insert new pages VI.000, VI.270 and VI.271.

( OVER )

INDEX TAB		CURRENT CONTENTS	CURRENT ACTION
VOL. 2 (Cont'd)	INTERACTIVE ACCOUNTING SYSTEMS	VII. Interactive Accounting Systems (pages VII.000 through VII.240)	None
	ENGINEERING PROGRAMS	VIII. Engineering Programs (pages VIII.000 through VIII.187)	Remove the entire old section and insert the enclosed new section.
	SPECIALIZED APPLICATION PROGRAMS	IX. Specialized Application Programs (pages IX.000 through IX.320)	None
	COMPANY LIT. SECTION	Contents—Company Literature Section (single page)	None
	1. Telenet	1. How to Use Telenet 2. The Telenet Report, Vol. 4, No. 1	None
	2. Scientific	1. APL/PLUS—The New Tool 2. Publication Order Form 3. Computer Decisions Reprint 4. Quickplan 5. APL*PLUS FPS 6. News Release 7. APL*PLUS VM Service	None
	3. UCS	1. History 2. Systems 3. Foresight 4. Financial Planning and Analysis 5. IFM 6. System 2000 7. INFORM	None
	4. Votrax	1. ML-1 and VS-6 2. LVM-50 3. ML-1 Multi-Lingual 4. VS-6 Electronic Voice System 5. Talking Points	None
	6. Trendata	1. Model 4000A and 4741 2. Data Communication Terminals 3. Model 4740	None
	8. Rapidata	1. Graphics 2. Probe	None
	10. ADP	1. "We've got enough products..."	None
	15. On-Line	1. OSCAR 2. ORBIS 3. "Are You Locking Up Your Resources..." 4. "Your Department's..." 5. "Improve Your Advertising..."	None
	17. Citibank	1. Concerned About... 2. Citishare — Fundamental Facts 3. Citishare — Price Schedule 4. Citishare — Network Access	None
	22. Zeta	1. Plotting the Future 2. Model 3653SX	None
	23. TSR	1. EML 2. INSIGHT	None
	24. CallData	1. DTSS 5. Engineers 2. TS/RJE 6. Market Managers 3. CompUtility 7. Financial Exec. 4. Project Mgrs. 8. Telescope Serv. 9. The Key Difference...	None
	25. Metrocom	1. Metrocom Inc.	None
	26. WU Data Services	1. Smarts Controller 2. EDT 1232 3. Data Communication Terminals	None
	30. INSCO	1. INSCO: Profile	None
	31. Datanetwork	1. Datanetwork Service Overview	None
	32. AVCO	1. An Introduction to Avco Computer Services	None
	36. UCC	1. Only a Phone Call Away 2. Project Planning 3. FMPS 4. The Switch 5. CTS	None





# *interactive computing directories*

## **CONTENTS** AND FILING INSTRUCTIONS

UPDATE NUMBER: 22

PAGE THREE

DATE: September, 1979

INDEX TAB		CURRENT CONTENTS	CURRENT ACTION
VOL. 3	IMPACT PRINTING TERMINALS	XI. Impact Printing Terminals (pages XI.000 through XI.443)	None
	THERMAL PRINTING TERMINALS	XII. Thermal Printing Terminals (pages XII.000 through XII.062)	Remove old pages XII.060, XII.061, XII.062 and insert new pages XII.060, XII.061 and XII.062.
	VIDEO DISPLAY TERMINALS	XIII. Video Display Terminals (pages XIII.000 through XIII.300)	None
	PRINTERS	XIV. Printers (pages XIV.000 through XIV.300)	None
	GRAPHICS TERMINALS	XV. Graphics Terminals (pages XV.000 through XV.124)	Remove the entire old section and insert the enclosed new section.
	REMOTE BATCH TERMINALS	XVI. Remote Batch Terminals (pages XVI.000 through XVI.022)	Remove the entire old section and insert the enclosed new section
	INTELLIGENT TERMINALS	XVII. Intelligent Terminals (pages XVII.000 through XVII.122)	None
	REMOTE BATCH SERVICES	XXX. Remote Batch Services (pages XXX.000 through XXX.483)	None

If you are missing any items, don't hesitate to contact ACU at P.O. Box 9003, Boulder, Colorado 80301 (303) 499-1722.

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# APPLICATIONS DIRECTORY

DIRECTORY  
ENTRY  
INDEX

COMPANY	ENTRIES IN ATSU's DIRECTORY SECTIONS												Co. Dir.	Geo. Dir.
	I. FINANCIAL MODELING LANGUAGES	II. INTERACTIVE DATA-BASE SYSTEMS	III. INTERACTIVE STATISTICAL PACKAGES	IV. INTERACTIVE GRAPHICS PROGRAMS	V. DATA BASES AVAILABLE TO USERS	VI. MANAGEMENT SCIENCES PROGRAMS	VII. INTERACTIVE ACCOUNTING SYSTEMS	VIII. ENGINEERING PROGRAMS	IX. SPECIALIZED APPLICATION PROGRAMS	X. REMOTE BATCH SERVICES	TOTAL	Entry Included	Number of Cities	
<b>ADP Network Services, Inc.</b> .....	1	1		2	20	1			1	1	26	X	51	
Agile Corporation .....		2		1							2			
Amcor Computer Corp. ....	1	2				5					8			
American Management Systems, Inc. ....			1	1							4	X	1	
<b>Avco Computer Services</b> .....	1			2	1	1	1		1		7	X	78	
<b>Boeing Computer Services Co.</b> .....	1	2	3	1		2	9				18	X	74	
Bowen Information Systems .....		1									1	X	36	
<b>CallData Systems, Inc.</b> .....	2	3	4		1	2	1	15	4	2	34	X	51	
Capex Corporation .....	1										1			
<b>Citibank, N.A.</b> .....	3			1							4		72	
Commodity Information Services .....	1				5						6			
CompuServe, Inc. ....		1					1				2			
Computel Systems Ltd. ....	1			1							4			
Computer Sciences Canada, Ltd. ....	1	2						2			3		7	
Computer Sciences Corporation .....						8					8			
Computer Sharing Services, Inc. ....	1	1				2		1			5	X	6	
Computer Usage Company .....											0		39	
Comshare, Incorporated .....	1		2		2						6		39	
Comshare Limited .....	1				2		3	1			6		5	
Construction Computer Control Corp. ....						1					1			
Core & Code, Inc. ....	1										1			
Cuffs Planning & Models, Ltd. ....	1										1			
Datalogics, Inc. ....		1				2					3	X	10	
Data Resources, Inc. ....	3	1	1	1	37	1					45	X	83	
Decisionex, Inc. ....	1						2				3	X		
Execucom Systems Corporation .....	1										1	X		
<b>General Electric Info. Serv. Co.</b> .....	1	1			13	5	2				22	X	162	
<b>Honeywell Datamatrix</b> .....						2					6	X	80	
Infonet Div. Computer Sciences Corp. ....		2						3	1		2	X	56	
<b>Informatics, Inc.</b> .....	1	4	2	3	1	1		2	2	1	17	X	72	
Information Bank, The .....					1						1			
Information Systems Design, Inc. ....											0	X		
<b>Inso Systems Corp.</b> .....			3								3	X	79	
Interactive Data Corporation .....	1	2		1	14						18	X		
Interactive Market Systems, Inc. ....		1	1		9			1			12	X	28	
<b>I.P. Sharp Associates Limited</b> .....	1	1	1	1	24						28	X	86	
Landart Systems Inc. ....											0	X		
Manufacturing Data Systems, Inc. ....				1							1	X		
Martin Marietta Data Systems .....											0	X		
Mathematica Products Group .....	1										1			
McDonnell Douglas Automation Co. ....	1	1	1	2			1				8	X	27	
Mellonics Information Center .....	2	3						2			6	X		
<b>Metrocom, Inc.</b> .....	1					1					5	X	17	
<b>Minicomputer Modeling, Inc.</b> .....	1										1			
Mitrol, Incorporated .....		1			1						2			

Entries in ATSU's Directory Sections indicate the products currently being marketed by each company, as evidenced by their submissions to ATSU.

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# APPLICATIONS DIRECTORY

DIRECTORY  
ENTRY  
INDEX  
(Side Two)

COMPANY	ENTRIES IN ATSU's DIRECTORY SECTIONS													Co. Dir.	Geo. Dir.
	I. FINANCIAL MODELING LANGUAGES	II. INTERACTIVE DATA-BASE SYSTEMS	III. INTERACTIVE STATISTICAL PACKAGES	IV. INTERACTIVE GRAPHICS PROGRAMS	V. DATA BASES AVAILABLE TO USERS	VI. MANAGEMENT SCIENCES PROGRAMS	VII. INTERACTIVE ACCOUNTING SYSTEMS	VIII. ENGINEERING PROGRAMS	XXX. SPECIALIZED APPLICATION PROGRAMS	TOTAL	Entry Included	Number of Cities			
MDX, Inc. ....				1			1			1					
MJK Associates . . . . .										1					
MRI Systems Corporation . . . . .		1								1	X				
Multiple Access Computer Group . . . . .										0	X				
National Computer Network of Chicago . . . . .			1							1	X				10
National CSS, Inc. ....		1		3		5	4	10	2	25	X				73
On-Line Systems, Inc. ....	1	1	1	1	2	1	1		4	12	X				71
Polycom Systems Ltd. ....										0	X				
PRC Computer Center, Inc. ....			3					1	1	5					2
Proprietary Computer Systems, Inc. ....										0	X				10
Pryor Corporation . . . . .	2	2	1	1	6		2		3	2	2	X			77
Rapidata, Inc. ....			1						4	17	X				
Remote Computer Corporation . . . . .		1	1							5	X				
Ross Systems, Inc. ....	1									2	X				27
Scientific Time Sharing Corp. ....	2		1	1	1	1		2		8	X				75
SDC Search Service . . . . .					64					64	X				58
Service Bureau Company, The . . . . .	1	1	3	1	9				1	16	X				86
SPSS, Incorporated . . . . .			1							1					
Standard & Poor's Fixed Income Systems . . . . .			1				1			2	X				
Stoner Associates, Inc. ....							4			4					
Structural Dynamics Research Corp. ....				3			4			3	X				
Sun Information Service Co. ....										3					
System Automation Company . . . . .		1						1		2					
Tektronix, Inc. ....			3							3	X				
Telenet Communications Corp. ....										0	X				
Time Sharing Consultants, Inc. ....	1		1	1						1					
Time Sharing Resources, Inc. ....										2					29
Tymshare, Inc. ....	2	2	1			1				6					
Uni-Coll Corp., The . . . . .										0	X				
United Computing Systems, Inc. ....	1	4	1	1					1	8	X				
University Computing Company . . . . .	1	1				2		8		4	16	X			16
Value Line Data Services . . . . .					1					1					
Warner Computer Systems, Inc. ....	1	1	1	2	2				1	8	X				29
Zeta Research . . . . .			2							2					

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FINANCIAL MODELING LANGUAGES

An Introduction to Financial Modeling ..... I.010

**ADP Network Services, Inc.\***

FML ..... I.020

**Amcort Computer Corporation**

FMS ..... I.040

**Avco Computer Services**

SIMPLAN ..... I.060

**Boeing Computer Services Company**

EIS ..... I.070

**CallData Systems, Inc.**

CALLPLAN ..... I.080

CUFFS ..... I.081

**Capex Corporation**

AUTOTAB II ..... I.100

**Citibank, N.A.**

BANK PLANNING ..... I.120

COMMAND IV ..... I.121

ENTERPRISE ..... I.122

**Commodity Information Services**

CISCO ..... I.130

**Computel Systems Ltd.**

ABC ..... I.140

**Computer Sciences Canada, Ltd.**

FLARES ..... I.160

**Computer Sharing Services, Inc.**

EMPIRE ..... I.180

**Comshare, Incorporated**

FCS ..... I.200

**Comshare Limited**

CPMS ..... I.210

**Core & Code, Inc.**

BBL ..... I.220

**Cuffs Planning & Models, Ltd.**

CUFFS-II ..... I.240

**Data Resources, Incorporated**

EMPIRE ..... I.260

EPS ..... I.261

FAS ..... I.262

**Decisionex, Inc.**

QUICK ..... I.280

**Execucom Systems Corporation**

IFPS ..... I.300

**General Electric Company - Info. Services Div.**

FAL II ..... I.320

**Informatics Inc. - Data Services Division**

SIMPLAN ..... I.340

**Interactive Data Corporation**

XSIM ..... I.360

**I.P. Sharp Associates Limited**

AIDS ..... I.380

**Mathematica Products Group**

RAMIS II ..... I.400

**McDonnell Douglas Automation Company**

AUTOPLAN ..... I.420

**Mellonics Information Center**

FORESIGHT ..... I.440

RAMIS II ..... I.441

**Metrocom Inc.**

FINMOD ..... I.460

**Minicomputer Modeling, Inc.**

DATA\*MODEL ..... I.480

**National CSS, Inc.**

EMS ..... I.510

**On-Line Systems, Inc.**

OLSFMS ..... I.500

**Rapidata, Inc.**

FISCAL ..... I.520

PROBE ..... I.521

**Ross Systems, Inc.**

MAPS ..... I.540

**Service Bureau Company, The**

PROPHIT II ..... I.560

**Scientific Time Sharing Corporation**

APL—PLUS EPLAN ..... I.580

APL\*PLUS FPS ..... I.581

**Timesharing Consultants, Inc.**

BPS-20 ..... I.600

**Tymshare, Inc.**

BBL ..... I.620

EXPRESS ..... I.621

**United Computing Systems, Inc.**

FORESIGHT ..... I.640

**University Computing Company**

MPS-F ..... I.660

**Warner Computer Systems, Inc.**

PROFORMA ..... I.680

\*Companies shown in **bold print** are Corporate Members of ACU.





## AN INTRODUCTION TO FINANCIAL MODELING

by David Combs

### I. WHAT IS FINANCIAL MODELING?

A *financial model* contains calculations and the assumptions needed to predict the future financial needs and/or profitability of a firm. The term "financial modeling" refers to both the construction and perfection of the model for forecasting purposes.

Why do financial modeling at all? Financial modeling allows the planner to ask "what if..." in order to consider the ramifications of various courses of action. As an analogy, if you were building an airplane or ship and wanted to decide on the right shape, you wouldn't build 20 different full-scale versions (at \$30 million each). Rather, you would build small "models" of the designed plane or ship, and "test" the model in a wind tunnel or a towing tank. Then, you could make some small change to the model, and test it again.

Well-designed models and experiments give the planner valuable information, and thereby assist in designing the "real thing". Of course, if the model is poorly designed, or the assumptions inaccurate, the results will be less applicable, or even misleading. Although it's not possible (or desirable) to build a Lilliputian-sized 1/2000th scale model of a firm, complete with factories, people, etc., as you can with a ship or airplane, it *is* possible to design *equations* to express the interconnected way the real world works.

Since corporate models are attempting to forecast numbers (such as dollars) rather than physical qualities, it is relatively easy to write equations which correctly inter-connect the financial variables. For example, (1) Interest can be expressed as a "rate" times the amount of debt, (2) Total sales might be calculated as the sum of the individual sales items, (3) Retained earnings for any year should be equal to the retained earnings for the previous year, plus profit this year (after dividends). The corporate planner usually has no great difficulty in expressing these inter-relationships in the equations. A solid knowledge of accounting, his own company, and how funds flow from one account to another is the biggest requirement.

Typically, one reserves the term "financial modeling" for situations involving more complex operations than simply adding or summarizing several sets of data, since these simple operations do not express assumptions about the future. What we will call a "*higher-level modeling*" frequently involves use of simultaneous equations, regression or other statistical techniques for forecasting, or some "logic" that might take the form: "When this is true, use this formula; but when this is not true and something else is true, then use a second method; and if none of these things are true, then use a third method".

(continued...)

Note that *nowhere* in our definition of a model or modeling has the word "computer" been mentioned. The calculations defined in the model (and the assumptions involved) might be performed cowboy-style on the palm of the hand, or by abacus, pocket calculator, or by, yes, even a computer. So the *tool* one uses has nothing to do with whether the activity is modeling or something else.

In fact, too often the word "model" has been misused by applying it to a process which, if done by hand instead of by a computer, would not be considered a "model" at all. A typical example is the use of a computer program simply to read numbers, add them up, and print the results in a "financial report."

In short, *FINANCIAL MODELING* is the process of trying to capture the key elements and assumptions needed to plan the future financial needs of the corporation. It involves:

1. Making certain assumptions to be used for *projecting into the future*.
2. Using *equations and logic* to express the interactions of various elements and assumptions.
3. The possible use of statistical techniques to estimate relationships between variables.
4. The preparation of financial reports that help to explain the inter-relationships of the variables involved.

## II. INTRODUCTORY ANALYSIS OF FINANCIAL MODELING ALTERNATIVES

Four basically different alternatives are available to the corporate planner for computer assisted financial modeling activities.

- A. Fixed and Pre-determined Financial Models
- B. Standard Programming Languages and APL
- C. Table, Matrix, and Report Generating Packages
- D. Higher-Level Modeling Languages

### A. The "Fixed" Packages

The first group, the pre-designed, pre-coded, pre-determined financial models, come complete with "input forms" and are ready to run. The corporate planner merely fills in the appropriate data for the accounts, has someone type the information from the form into the computer, and the fixed package takes over. Very, very simple.

Many of these fixed packages were originally developed by large banks and accounting firms for their own internal use, or for consulting, and provide very generalized models with broad applicability. One of the primary design goals of these systems is standardized input (so anyone could learn to fill out the forms), and standardized assumptions and reports which make it easy to use. Those design goals, of course, make good sense, considering their typical user: an analyst doing quick projections or ratio reports on company after company after company.

We call such systems "fixed modeling packages" because the internal logic (the inter-relationships between the variables, which are the assumptions about how the future



will work) are pre-coded, fixed, and unchangeable by the user.

Some "fixed" models do allow the user to change account names, to enter different types of data, or to select alternative calculations (from a fixed list of possible methods) by typing in a "code" to tell the model how to calculate. A particular code may indicate that the data is actual dollar amounts, or perhaps that it is a compound growth rate. Another code may be used to select a particular compound growth rate. Another code may be used to select a particular depreciation method. Regardless of the number of "codes" available, the alternative methods are still pre-determined and (to our knowledge) not alterable by the user.

The beauty of the "fixed" package is its simplicity. With a manual from the vendor, and a supply of "input sheets," you fill out the historical (base period) data, and choose projection methods for each account from the set made available.

For many companies, this ease of use and speed (development time is cut to zero) far outweigh the inflexibility. If these are also your primary design goals, and the assumptions and criteria of the package apply to your firm, these packages will be ideal for you.

The "fixed" packages are well suited for such situations as the credit department in a bank, for an acquisition-hungry company analyzing many candidates, for a headquarters group looking for standardized summary information from its subsidiaries, or for an insurance company evaluating many loan candidates.

The *inflexibility* of the "fixed" packages is their greatest disadvantage. For instance, these packages typically deal only in years. Suppose you want to do a forecast by quarters, or months. How would you handle purchase-payment time lags or taxes accrued monthly and paid only four times a year?

Whichever of these "fixed" packages you investigate, you will want to explore the possibilities of including special features to meet your own particular needs (a special depreciation method, a special tax calculation, etc.). Changes may be relatively easy if you have access to the source code, or you may find it prohibitively expensive, or perhaps even impossible. Since representatives of some firms will make these changes, be sure to cover this ground before making a final decision.

## **B. The Standard Programming Languages and APL**

If your own company's programming support group develops the model, they may prefer to use one of the standard programming languages such as COBOL, FORTRAN, or BASIC. Traditionally, this is the most time-consuming and costly method to develop a model, although it may be the least expensive to run once developed.

However, because of the massive programming necessary to develop a realistic financial model, the model quickly becomes "fixed" and infeasible to change. Thus, it cannot respond easily or quickly to the changing assumptions and inter-relationships with which the corporate planner must deal daily.

In addition, the code is unreadable by any non-programmer, and any time a planner wants to change anything, no matter how simple it may be, he has to call in the programming staff and tediously explain the problem to them. (With the packages discussed below, he can make the changes himself.)

APL, on the other hand, is a standard programming language frequently mentioned in

relation to financial reporting and modeling. It is a concise programming language which can operate automatically on whole series of data. Because APL is much talked about, it is worth some special discussion here. Consider this example:

To calculate a ratio over the last ten years, you might use the statement:

$$\text{CURRENT RATIO} = \text{CURRENT ASSETS} / \text{CURRENT LIABILITIES}$$

If all three accounts each hold ten years of data, the computer will calculate the current ratio for all ten years. You do not need a "looping" command; APL will *automatically* do the operation for all the periods.

In my opinion, it is this feature (and generalizations of it) that gives APL its great power. You don't need to become involved in complicated "programming," no "loops" are needed, and the program looks clean and reads well.

APL runs very inexpensively when it calculates a whole series, for all periods, *all at once*.

However, here is the other side of the coin: Suppose you wanted to do a balance-sheet and income-statement forecast using APL. Because profit *must* be added into retained earnings *each year*, and because of the way interest *must* be charged on needed debt, every account in the entire model needs to be solved completely for one period before it can go on to the next period. You can't begin to calculate year two before you have forecasted all accounts for year one.

This is true whether you are using APL, FORTRAN, a pad of paper, your head, or one of the higher-level financial modeling packages (where the "looping" through all accounts, one period at a time, is done automatically).

This has several implications:

1. You must now program "looping instructions" into your model.
2. You must attach subscripts to your accounts, as for example, (if time period = t)  
Retained Earnings (t) = Retained Earnings (t-1) + Profit (t)

Note: This now resembles a FORTRAN program.

3. The amount of compute time rises, because APL must translate and reinterpret each line over and over, once per period. Further, if the model was set up to handle simultaneous equations, and they were solved in the normal iterative method, each statement would be interpreted perhaps ten times per period, for a possible total of over 100 times per run.

Thus, APL is a superb tool for any situation where each APL statement is "executed" only once, and calculations can be done "all slots at once" for each item. Furthermore, programs look nice, the computation cost is almost non-existent, and APL is ideal for any analysis involving historical, known data. But once you change the problem so that looping is required, the advantages of APL are less obvious.

### C. Table, Matrix and Report Generating Packages

Of the many, many packages marketed in the U.S. today as "financial modeling systems," the great majority of these packages fall in the category of table, matrix, and report

generating packages.

Originally, these packages were designed to automate the typing out of tabular data. Typically, they also allow some simple calculations on the rows and columns of data. Nothing too complicated, but quite sufficient for many applications. These packages are very widely and successfully used to produce reports which are frequently updated.

The data is generally stored in the system in a large "matrix" and the calculations which are done are performed on this matrix. If you are investigating these packages, you will want to know how big the matrix may be: how many accounts and how many columns of data are allowed.

These table-producing packages fall into two distinct groups:

#### 1. THOSE WITH A LANGUAGE CLOSELY RESEMBLING FORTRAN OR BASIC

These allow more powerful calculations but do require some familiarity with a programming language and definite knowledge of programming top-to-bottom logic. Which of these languages is already familiar to your staff might well determine which of these packages you want to use.

#### 2. THOSE WITH THEIR OWN LANGUAGE

The majority of these packages have their own language to specify the operations to perform on the rows (the accounts) and the columns (the time periods). These "languages" do not require any great expertise, since the operations are generally fairly simple, such as summarizing various accounts and totaling various columns.

Although many of these packages were originally developed for simple table presentation, some may be represented as solutions to ALL financial planning problems — not only for table producing jobs but also for complex financial modeling. There is no question that many of these packages are excellent tools for organizing and reporting financial data. But few can perform the functions of the higher-level financial modeling packages that will be discussed below.

Many analysts discover that the simplest and most trivial historical income statement and balance-sheet model may become non-trivial to solve for *forecasted* periods, even if done by hand. The reason is that the order of calculations in most models is simply *not* top to bottom, and in all probability, involves at least one "simultaneous equation."

One fairly good way to see if a package is designed for truly complex modeling is from the examples in the user manual. The manual may show an example of an Income Statement projection. If there is *also* a projection of the accompanying Balance Sheet, and if the Income Statement and Balance Sheet are *linked* together by an "add profit into retained earnings" relationship, the package will probably handle complex financial modeling.

If no such example of a Balance Sheet and Income Statement combination appears, you may wish to ask the sales representative to develop one for you. It needn't be complex — a few accounts (10 or so) will do. Just make sure that the model takes care of income credited into retained earnings, and that the model somehow determines how much money needs to be borrowed each year or month, then *actually borrows* the money

(increases debt), and insures that the interest figure reflects this. This is a fairly common task for most "higher-level modeling packages."

#### D. Higher-Level Modeling Packages

The final group of packages fall in the category of "*Higher-level Modeling Packages*," as I define them. Most of these packages were designed to meet the needs of the corporate planner who wants to develop his own realistic corporate planning model — with all the complexities called for.

These "higher-level modeling packages" may be distinguished by two important features:

1. The Ability to Reorder the Equations
2. The Ability to Solve Simultaneous Equations

These packages all have internal schemes for analyzing the model created by the corporate planner, and re-order the calculations into a "recursive" ordering. This one feature is *PERHAPS THE MOST IMPORTANT FEATURE* for the future of financial modeling, because it *frees* the corporate planner from the requirement that he design his model in a "top-to-bottom" calculation sequence. It enables him to write the equations of his model in *any* order, and the *computer* figures out the actual order required for calculation. This method of writing a computer planning model is a step *far removed* from the traditional programming level!

This short example illustrates what is meant by "re-ordering" the equations. If you wrote the following "model:"

$$\begin{aligned}A &= B + C \\B &= C + 50 \\C &= \text{data from the user}\end{aligned}$$

in exactly that order, the package (or computer) should be able to *internally reorder* the equations into the proper calculation order of C, then B, and then A. This ordering should preferably be done *automatically*.

Reordering is also important when the planner wants to make some change in the way the model works. Analysts may find that a small change of  $B + C$  to  $B + D$  could *completely invalidate* the old calculation order. With a package that did not have this feature, the user might have to rearrange or rewrite a large part of the model. On the other hand, with automatic reordering, the corporate planner *does not even have to be concerned* with the order of calculation.

Equally important, it is preferable for the modeling package to automatically search for, detect, and solve simultaneous equations. At first glance, this feature would seem useless in financial modeling. After all, aren't engineers, physicists, and mathematicians the only ones who deal in simultaneous equations?

Not at all. These situations frequently arise in most realistic planning models. In doing a pro-forma projection, for example, it is usually the *excess* of assets over supporting liabilities and equity that is the amount that must be borrowed (or stock sold) in year X to bring things back into balance. If *current interest* is made to reflect this added increment

of debt, then that increment of interest will work to reduce profit, which will cause retained earnings to grow less than previously thought by the model. But that changes the out-of-balance amount on the balance sheet, which changes the debt, which changes the interest, and so on...

There is nothing particularly complicated about the above. People have long known how to solve this type of circular relationship, closing problem, or "simultaneous equation." By hand, the usual approach is to go through the calculations several times, until the results stop changing much. Corporate planners have done this for years, and the computer does much the same thing.

The combined abilities to reorder the calculations and to solve simultaneous equations gives the corporate planner the freedom and ability to ask "What if?" to many different assumption and calculation methods *without having to redesign the structure of the entire model*. In addition, it allows the corporate planner to concentrate on the heart of the model — those all-important formulas that tell how each individual account relates to the rest of the model.

The primary disadvantage of the higher-level packages is that they generally require both more computer time and more memory within the computer. If you have your own time-sharing system this may have no real impact, because the extra resources necessary may amount to only a very small percentage of the computer's total available resources. However, if you are using such a package on an outside commercial time-sharing service, and you have a large volume of work to do, you may find that these factors can translate into some truly astounding bills. This is because the vendors typically "bundle" the cost of *all* services, salaries, and overhead into the single item: number of compute seconds used, in some cases even *multiplied* by the amount of memory used. Thus, those who do more computing are naturally charged more overhead. While this method may do a reasonable job of pricing the normal time-sharing program, which requires little core and runs quickly, it has the effect of penalizing the higher level languages which may use more time and memory.

In conclusion, even though we have discussed at length the tools which may be used for financial modeling, the key to *meaningful* modeling is the *quality* of the model. The quality, accuracy, and applicability of the model depend solely on the equations and logic which make it up. In the end, which of the variety of languages, packages, and services the corporate planner chooses will depend on his particular applications, his personnel, and the money available.

Whatever the decision, it is vital that management itself becomes actively involved, that the assumptions are well thought through, and that the equations and logic accurately express the financial planning problem.

Since the opportunity cost of doing the wrong thing can be high, it certainly behooves us to expend the necessary amount of effort, money, and time to explore this field before jumping in. It is hoped that this introductory analysis and ATSU's Applications Directory gives at least a starting point for this purpose.







Company Name : **ADP NETWORK SERVICES, INC.**

Headquarters Address : **175 Jackson Plaza, Ann Arbor, MI 48106**

Product Name : **FINANCIAL MODELING LANGUAGE (FML)**

Number of years commercially available : **Two (2)**

Date of last up-date or improvement : **Continuous**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Michael Dumas** Telephone No.: **(313) 769-6800**

### General Description

ADP Network Services' Financial Modeling Language, FML, facilitates the exploration of alternatives, speeds the decision-making process while improving its quality, permits more effective planning and provides a better understanding of the relationships that govern your business. FML does these things by using the power of the computer to simulate events before they occur, to model the effect of financial, policy and planning alternatives before they are implemented.

The modeling process is basically straightforward. Known financial relationships for your business are entered into the computer with a standard terminal. FML permits you to concentrate on the relationships and concepts that govern your business instead of the mechanics of computer operation. Once the relationships are specified and the data are in place, the consequences of changes in any variable- or variables- can be examined. Modifying the model to reflect new realities or expanded requirements is easily accomplished. The large number of capabilities built into the modeling language itself facilitate fast production of reports and analysis with simple commands. A complete range of capabilities including forward and backward "what if," sensitivity analysis, risk analysis and a battery of built-in financial functions is available.

In addition to the data you provide, FML can also create reports and analysis using ADP Network Services' extensive range of financial and economic data bases. These data bases provide financial information on over 3,500 public companies and data on regional, national and international economies. Sophisticated statistical analysis can be included in FML models using a simple interface with TSAM, ADP's proprietary statistical and time series analysis system.

### Special Features

- Risk Analysis
- What-If Analysis
- Goal Setting ("backwards" what-if analysis)
- Sensitivity Analysis
- Management Quality Custom Reports
- Economical Processing through the use of recent advances in compiled models.
- Compatibility with other ADP products for powerful statistical analysis and high quality graphics
- English commands in an easy to use language
- Financial functions for modeling complex business relationships with ease
- Easy access to a wide variety of economic and corporate Data Bases



Company Name : **AMCOR COMPUTER CORPORATION**

Headquarters Address : **1900 Plantside Drive, Louisville, KY 40299**

Product Name : **FMS - FINANCIAL MODELING SYSTEM**

Number of years commercially available : **Three (3)**

Date of last up-date or improvement : **August, 1978**

Approximate number of current users : **30**

Purchase price if available on in-house equipment : **Contact Company**

Type(s) of equipment compatible for in-house use : **Digital Equipment Corp. PDP 11 Series with RSTS/E Operating System**

Headquarters contact : **Robert G. Bearden**

Telephone No.: **(502) 491-9820**

## General Description

**FMS - A highly sophisticated, interactive, FINANCIAL MODELING SYSTEM based on mathematical and accounting relationships. The system is designed to be operated in an on-line environment utilizing the RSTS/E operating system on any member of the PDP 11 series computers.**

**A simple, conversational text-editing system assists you in preparing and changing models. FMS automatically retains all instructions and data that it has been given, enabling reports and analyses to be repeated or revised when new information becomes available.**

**FMS models can access data from other programs on the same computer, i.e. general ledger, and can pass information to other models, enabling you to construct integrated consolidation and reporting systems.**

## Special Features

- All Arithmetic Functions
- Positive/Negative Values
- Leads and Lags
- Inflation and Discounting
- Maximum and Minimum
- Net Present Value
- Rate of Return
- Amortization
- Depreciation
- Moving Average

- Interpolation
- Discounted Cash Flow
- Regression Forecasting
- Complete Control of Report Formats
- Line Plots
- Bar Charts
- Histograms
- Hierarchical Row and Column Structure
- Rounding
- Conditions and Comparisons





Company Name : AVCO COMPUTER SERVICES  
Headquarters Address : 201 Lowell Street, Wilmington, MA 01887

Product Name : SIMPLAN  
Number of years commercially available : Two (2)  
Date of last up-date or improvement : September, 1978  
Approximate number of current users : 750  
Purchase price if available on in-house equipment : \$37,500  
Type(s) of equipment compatible for in-house use : IBM  
Headquarters contact : Lawrence B. Snell  
Telephone No.: (617) 729-7700

## General Description

**SIMPLAN\*** is a system which supports the financial planning and budgeting functions of commercial and government organizations. SIMPLAN puts the power of a large computing system under the direct control of professional planners, financial analysts, marketing analysts and business managers. SIMPLAN eliminates the need for computer specialists to go between the computer and the end-user.

The SIMPLAN system provides the user with a complete set of functions and facilities for entering, storing, manipulating, and reporting time series data. Data can be entered or updated either interactively or through a batch run. Data is identified by user-specified names and stored in a SIMPLAN database. When the data is needed for a model or report, the user calls for it by its name. SIMPLAN provides the user with a variety of standard forecasting, statistical, econometric, financial, and arithmetic functions, as well as an equation-oriented modeling language. Reports in almost any format are easy for the user to obtain, using the SIMPLAN report generator. To help the user specify and change the models and report definitions, SIMPLAN has a flexible text editor. Models may be solved either recursively or simultaneously.

Typical applications of SIMPLAN are:

- Cost allocation modeling
- Capital budgeting
- Cash planning
- Budget consolidation
- Sales forecasting
- Econometric modeling

\*SIMPLAN is a copyrighted computer software system of SSI.

## Special Features

- **DATABASE** - Models and reports refer to a single, common source of data, resulting in simpler data entry, easier data management, faster development of models and report programs and greater user confidence in the outputs.
- **SECURITY** - Data, models, and report programs can be protected against unauthorized access.
- **INTERACTIVE OR BATCH** - Data, models, and report programs can be entered and tested quickly in the interactive mode and then operated on routinely in the batch mode.
- **INTERFACE TO OTHER SYSTEMS** - User-written programs can be used by SIMPLAN models; user-written programs can access and update SIMPLAN databases.
- **GRAPHICS** - A user can produce plots of professional quality by using a variety of options such as logarithmic scales, interpolations, ratios, labeling and titles.



Company Name : **BOEING COMPUTER SERVICES COMPANY**

Headquarters Address : **Corporate Headquarters, 177 Madison Ave., Morristown, NJ 07960**

Product Name : **EIS (Executive Information Services)**

Number of years commercially available : **(Two) 2**

Date of last up-date or improvement : **October, 1978**

Approximate number of current users : **200**

Purchase price if available on in-house equipment : **Variable based on modules desired**

Type(s) of equipment compatible for in-house use : **IBM 370 with CMS**

Headquarters contact : **Robert L. Cullen** Telephone No.: **(206) 773-2790**

### **General Description**

EIS is a financial analysis and forecasting system, with which the user interacts with the system conversationally or batch. Both the logic and the systems are English.

EIS is a full function system with all functions completely integrated. It has modeling report writing, high resolution graphics, a stat and forecasting library, a financial library, and a data base specifically designed for time spread data.

The data base allows users to define and structure commands and data hierarchies, automatically generate computational summaries, store numerous iterations of data throughout the decision-making processes, and automatically accounts for data over time. The retrieval of raw data and/or report formats with any combination of literal, numeric and graphical displays allows users access to the data based upon their request specifications.

The EIS report writer and graphics features can produce the high quality output required for top management. The two can be combined to produce reports with both tabular and graphics data. The user has complete systems control to enter commands at the terminal and immediately see the result of his request, or conveniently store them in files that can be executed with just one command.

### **Special Features**

- Ten graph types: (time series, functional, horizontal bar, vertical bar, horizontal stock market, vertical stock market, log log, semilog, log-log squared, and pie) with eight line types and seven shading types.
- Scope, flatbed, and daisy wheel graphics supported.
- Financial Applications Library: Investment Analysis, Lessee/Buy Analysis, ROI, Depreciation, Loan, Backward Iteration.
- Statistical Applications Library: Regression Analysis, Exponential Smoothing, Analysis of Variance, Hypothesis Testing, Common Sampling Distributions.
- Zero Base Budgeting supported as a data base application.
- What-If Analysis capability in models and data base.



Company Name : CALldata SYSTEMS, INC., Subsidiary of Grumman Data Systems Corp.

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : CALLPLAN

Number of years commercially available : Two (2)

Date of last up-date or improvement : November, 1977

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : \$44,000

Type(s) of equipment compatible for in-house use : AMDAHL V/5

Headquarters contact : Walter Winfree

Telephone No.: (516) 575-6407

### General Description

CallPlan is a state-of-the-art management tool for forecasting, reporting, modeling and analyzing information. CallPlan has been designed from the user's point of view for use by the professional manager who may not have had computer related experience. CallPlan will also appeal to the more sophisticated users of time-sharing because of the ability to perform higher level functions.

CallPlan is extremely powerful. This coupled with its English-like statement orientation provides a system of unparalleled flexibility and usability.

CallPlan reports are produced according to user specified formats and criteria or by defaulted rules. Both format and analysis statements may be altered instantly to satisfy changing requirements or to investigate alternative options, without altering the original versions of the model. This is known as the "What-If" capability.

CallPlan is a truly complete and dynamic tool allowing the user to satisfy all requirements for model building, execution, debugging and editing directly within the CallPlan control environment. In addition, data files may also be created directly from within CallPlan. The control environment also supports the full set of Amdahl 470V/5 subset commands. Furthermore, CallPlan provides a news feature and a version number so that the user will know what's happening.

Some common application areas are: P&L and Balance Sheet Analysis, Cash Flow, Marketing & Sales Forecasting, Acquisition and Merger Analysis, Sales Commission Planning, Pricing Analysis, Financial Projections, etc. One of its strongest features is the multiple options for performing corporate, product line or cost center consolidations.

### Special Features

- Large model size capability
- Built-in regression & forecasting
- Built-in calculation & business functions (ROI, DCF, Depreciation)
- Security of models & data thru cyphering
- Graphical & tabular reporting
- Powerful debugging capabilities
- Production run environment
- Automatic consolidation
- User subprograms capability
- Automatic row/column definition for fast spread sheet analysis
- Input forms generation
- "What-If" analysis
- Re-run without recompiling entire model
- Multi-report processing & cross-report data referencing
- Conditional & non-sequential rules processing
- Logic table capability
- Variable model statements
- Built-in editor
- Programmable command files



Company Name : CALldata SYSTEMS, INC., Subsidiary of Grumman Data Systems Corp.

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : CUFFS

Number of years commercially available : Four (4)

Date of last up-date or improvement : March, 1977

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : DEC 10

Headquarters contact : Walter Winfree

Telephone No.: (516) 575-6407

## General Description

CUFFS\* is an interactive financial modeling language that can be used in planning and forecasting the results of many business decisions. Its flexibility permits the user to model his financial organization as it is, without compromise to suit computer capabilities. When alternative financial decisions are entered, CUFFS indicates the short-term and long-term effects of each. CUFFS can be used to generate and forecast:

- P&L Statements
- Balance Sheets
- Cash Flow Statements
- Trend Line Calculations
- Moving Averages
- Other Detailed Financial Reports

CUFFS is designed for use in any planning or forecasting activity regardless of complexity. There are no restrictions on the number of historical or projected periods. It can provide consolidation, spreads and breakdowns. By running models backward, it can also derive performance criteria for reaching specified goals.

\*Combs Unangst Financial Forecast System — a product of CUFFS Planning and Models, LTD.

## Special Features

CUFFS is easy to use, and no specialized knowledge of computers or programming is required. Among its operational features are:

- An economical "snapshot" capability to report on limited business areas
- Determination of present value and internal rate of return
- Allowance for seasonality and complex time lags
- Tax-loss carry-forward computations
- Conversion tables for foreign currency
- "Run backward" capability
- Solves simultaneous equations
- Performs min-max calculations
- Plots and Histograms
- English-like commands
- Reorders equations

Company Name : CAPEX CORPORATION

Headquarters Address : P.O. Box 13529, Phoenix, AZ 85002

Product Name : AUTOTAB II

Number of years commercially available : Seven (7)

Date of last up-date or improvement : November, 1978

Approximate number of current users : 475

Purchase price if available on in-house equipment : \$17,000 perpetual license - \$775 one year lease

Type(s) of equipment compatible for in-house use : IBM 360/370

Headquarters contact : Ron Michelson

Telephone No.: (602) 264-7241

## General Description

Comprehensive corporate financial models, large multi-division budgeting systems, and consolidated financial forecasts are the types of applications for which AUTOTAB II excels. AUTOTAB II is designed for financial planning systems that involve many companies, divisions, departments, properties, product lines, cost centers, or profit centers. It enables financial planners to build major planning systems that evolve and expand over time with the needs of the business.

The AUTOTAB II language contains the sophisticated features, functions, and capabilities needed by financial planners and financial analysts. At the same time, it is easy to learn and easy to apply. It is actively used now by literally hundreds of financial planners and analysts in all facets of their activities.

AUTOTAB II provides extensive consolidation facilities. For example, budget proposals prepared by departments can be easily consolidated to a corporate budget proposal. Changes can be made to a single department report and automatically rippled through to all higher level reports. Easy to use, automatic consolidation features are the keys to building large planning systems of any kind.

The result of all financial planning systems is reports. AUTOTAB II automatically produces beautiful formatted, ready-to-use reports. Graphing facilities are also available to highlight trends and bottomline numbers

## Special Features

A "WHAT IF" facility allows up to 40 alternatives to be evaluated in a single execution. "Best Case", "Worst Case", "Normal Case" conditions can be specified; and in a single execution, a report is produced for each case. There is no limit to the complexity of the assumptions. Further, "WHAT IF" assumptions at any level can be consolidated to the overall corporate level.

A wide range of analytical capabilities are available to AUTOTAB II users. They include forecasting (using, for example, regression analysis or exponential smoothing), depreciation, return on investment, present value, discounting, aging, amortization, and even sorting. The size of numbers that can be handled and the precision is not approximated by any other system. With all these features, AUTOTAB II requires very little computer time to execute.

AUTOTAB II isn't just a product, it is understandable documentation, user training, and product support. Behind AUTOTAB II is a CAPEX staff of financial analysts and product specialists to provide on-going customer support.



Company Name : CITIBANK, N.A.  
Headquarters Address : 399 Park Avenue, 23rd Floor, New York, NY 10043

Product Name : BANK PLANNING  
Number of years commercially available : Nine (9)  
Date of last up-date or improvement : July, 1976  
Approximate number of current users : 60  
Purchase price if available on in-house equipment : Available on time-sharing only  
Type(s) of equipment compatible for in-house use : Standard time-sharing terminal  
Headquarters contact : Deborah Besemer  
Telephone No.: (212) 559-4925

## General Description

BANK PLANNING provides controllers with tools for faster, detailed financial analysis. The programs provide a comprehensive means of producing both spreads and forecasts. It is possible to very quickly determine historical growth rates, liquidity and capital ratios, cost structure, etc. Balance Sheet and Income Statement assumptions from the basis for full statement forecasts for the institution. Assumptions are easily changed enabling several variations of the forecast. "What-If" and sensitivity analysis are now possible without excessive manual calculations.

The print-out can be displayed in any of the nine statements as follows:

- Pro-forma Balance Sheet
- Income Statement
- Asset Distribution Report
- Sources and Distribution of Earnings Report
- Ratio Analysis - Liquidity, Profitability and other Standard Performance Ratios
- Security, Deposit, and Loan Mix
- Capital Adequacy Tests
- Yield Analysis to indicate sources of income
- Footnotes and User Remarks

## Special Features

Citibank provides:

- Training seminars for your officers in the use of the program
- Installation of the program on a network computer serving the user's region
- Savings on computer programming and program storage costs
- Continuous R&D efforts for new products to aid bank management





Company Name : CITIBANK, N.A.

Headquarters Address : 399 Park Avenue, 23rd Floor, New York, NY 10043

Product Name : COMMAND IV

Number of years commercially available : Nine (9)

Date of last up-date or improvement : October, 1978

Approximate number of current users : 60

Purchase price if available on in-house equipment : Available on time-sharing only

Type(s) of equipment compatible for in-house use : Standard time-sharing terminal

Headquarters contact : Deborah Besemer

Telephone No.: (212) 559-4925

## General Description

COMMAND IV is a financial planning system available on a worldwide time-sharing network. COMMAND IV is comprised of a series of programs designed to assist the corporate financial manager with the evaluation of alternative decisions and economic conditions and their impact on company financial statements. The system has a broad range of capabilities that enable the financial manager to produce complex business forecasts based on company key assumptions.

### Applications include:

- Evaluation of alternate short and long term financing strategies
- Assessment of potential acquisitions and the impact of related financing
- Cash flow and variance analysis for introduction of new product or project
- Coordination of capital expenditures, debt repayment, and dividend payout
- Planning and controlling divisional performance.

COMMAND IV is easy to use and designed for the financial executive with no computer-related experience. Preprinted input forms provide a fixed format from which the user chooses the accounts and account titles which are applicable to his company. On-site training and detailed instruction manuals are provided by Citibank.

COMMAND IV has been expanded and refined over the years and today represents the vast experience and expertise Citibank has in dealing with the financial needs of the corporation.

## Special Features

- Easy to operate with simple English commands
- Comprehensive depreciation schedule and tax calculation
- Detailed capitalization section handles intricate debt and equity calculations
- Consolidation capability includes option for specifying fixed or varying exchange rates
- Continuous support and development for COMMAND IV by Citibank.



Company Name : CITIBANK, N.A.  
Headquarters Address : 399 Park Avenue, 23rd Floor, New York, NY 10043

Product Name : ENTERPRISE  
Number of years commercially available : Three months  
Date of last up-date or improvement : n.a.  
Approximate number of current users : 2  
Purchase price if available on in-house equipment : Please contact Citibank Headquarters  
Type(s) of equipment compatible for in-house use : Seven, including IBM, Digital and Honeywell  
Headquarters contact : Linda A. Quandt Telephone No.: (212) 559-5480

### General Description

ENTERPRISE is a new, computationally powerful financial forecasting and reporting system. ENTERPRISE is designed especially for the corporate financial planner. It allows you to easily tailor a financial model to your company without the time-consuming effort of a programming language.

ENTERPRISE is more than specialized routines for accounting calculations. The ENTERPRISE system contains all the accounting logic for automatically generating historical and pro-forma financial reports.

The features of ENTERPRISE range from the capabilities to easily express seasonal sales patterns, precisely time working capital inflows and outflows, capital expenditures and debt schedules to variable time period forecasting.

For experimenting with forecasting assumptions, extensive, easy-to-use "what if..." analysis capabilities are available.

ENTERPRISE is suitable for target based profit planning, cash flow projections, debt structuring, capital budgeting, acquisition analysis, and a variety of other financial applications.

### Special Features

- Built-in Accounting Functions:
  - Depreciation - Includes Straight Line and Accelerated methods
  - Asset Disposal
  - Taxes - Investment Tax Credit and Tax Loss
  - Carry Forward/Back
  - Present Value
  - Mortgage/Loan Amortization
  - Compound Interest
- English Language Syntax
- Automatic Balance Sheet Funds Surplus/Deficit Computation
- Automatic Equation Re-ordering
- Curve Fitting
- Moving Averages
- Monte Carlo Simulation
- Interactive "What If..." Analysis



Company Name : **COMMODITY INFORMATION SERVICES**Headquarters Address : **175 West Jackson Blvd., Chicago, IL 60604**Product Name : **CISCO Financial Futures**Number of years commercially available : **One (1)**Date of last up-date or improvement : **n.a.**Approximate number of current users : **15**Purchase price if available on in-house equipment : **n.a.**Type(s) of equipment compatible for in-house use : **n.a.**Headquarters contact : **Donald Jones, Manuel Abundis**Telephone No.: **(312) 922-3661****General Description**

The "CISCO" financial language set is designed for the interest rate future-government bond trading market. The language is a composite of the "CISCO" programming system and the CI data bases (see our write up in the section on on-line data-bases). The language is totally interactive with a large number of functions pre-programmed. Included in the language is the capability for the user to develop his own programs (in Fortran), drawing upon the CI subroutine set if desired. The data-base consists of futures on the interest rate instruments (GNMA, T-bills, T-bonds, Commercial paper, etc.) and the cash prices on government bonds, notes, bills and GNMA's. The futures go back to the beginning of trading in 1975, on a daily basis and are updated daily after close of trading. The cash consists of all traded treasuries and GNMA's since January 1, 1978, updated daily, with selected historical prices being added as needed for research purposes. Typical 'canned' programs available include those for arbitrage and hedging, yield curve comparison; yield analyses; general market analyses via moving averages, trends, oscillators, etc; trading models; hedging models; and general utility programs for data retrieval and analysis.

**Special Features**

The customer programming capability is greatly facilitated by the data calling set-up. A single call retrieves all the information available on any particular future. This data, which may consist of up to 600 days of open, high, low, settlement, volume and open interest, is placed in the customer's workspace and is immediately available for use. There are over 40 system sub-routines for date manipulation, analytical functions, statistics, linear regression, and utility purposes that the programmer may access.



Company Name : **COMPUTEL SYSTEMS LTD**

Headquarters Address : **1200 St. Laurent Blvd., Ottawa, Ontario K1K 3B8**

Product Name : **ABC - FINANCIAL PLANNING/ANALYSIS FOR MANAGEMENT**

Number of years commercially available : **9 years (Improved version)**

Date of last up-date or improvement : **1978**

Approximate number of current users : **25**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **IBM**

Headquarters contact : **B. Klett, Product Manager, Financial Services** Telephone No.: **(613) 746-4353**

### General Description

- Budgeting
- Performance Reporting and Variance Analysis
- Capital Expenditure Analysis
- Pro Forma Analysis
- Cash Management
- Capital Budgeting
- Financial Decisions
- Manpower Planning
- Product Planning
- Sales Forecasting and Analysis

These are a few of the areas in which the accounting spreadsheet/worksheet is commonly used. Whether it is budgeting, reporting, forecasting or analysis a great deal of time-consuming drudgery is generally involved in the spreadsheet calculations and preparation of management reports. Clerical and accounting type tasks, although very necessary, occupy too much time. Too little time usually remains for study and analysis even after compromising by reducing the number of accounting parameters and time periods or by simplifying the calculations.

ABC is a management tool that addresses this situation. ABC allows the clerical and accounting tasks to be automated to a maximum practical extent. ABC allows the scope of the study to be comprehensive - calculations, iterations and consolidations can be as many and as complex as needed. And ABC is fast, accurate and easy to use. The end result is more time for the analysis stage and consequently better results from the whole process.

### Special Features

- Unlimited consolidation
- Easy editing of consolidation structure
- Library of financial calculations
- Escalating, discounting, interpolation, calculation, depreciation
- Selective retrieval
- Interface with any data
- Flexible report generation
- Run both batch and interactively
- Fully modular
- Graphics capability
- Comprehensive user guide
- Full data editing
- Security control levels
- Cross-reference, Index



Company Name : COMPUTER SCIENCES CANADA, LTD.  
Headquarters Address : Suite 367, Place du Canada, Montreal, Canada H3B 2N8

Product Name : FLARES  
Number of years commercially available : Five (5)  
Date of last up-date or improvement : April, 1977  
Approximate number of current users : Approximately 50 in Canada  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Paul Malvern

Telephone No.: (416) 363-8401

## General Description

FLARES (Financial Language for Analysis and Reporting) is a generalized financial analysis and modeling system. English language commands make FLARES easy to use so that non-programmers can build their own models. At the same time it is capable of handling the most sophisticated application.

Among FLARES most common applications are:

- Forecasting
- Budget preparation and performing evaluation
- Cash flow analysis
- Consolidation
- "What If" and sensitivity analysis
- Capital budgeting
- Risk analysis
- Financial planning and reporting

## Special Features

Among FLARES key features are:

- Easy consolidation and currency translation
- Full range of canned statistical and financial sub-routines: NPV, IRR, DEPRECIATION, CURVE FITTING, etc.
- Conversational graphics capability
- Powerful simulation techniques
- Extensive data handling capabilities (data base, files, prompts from terminal)



Company Name : **COMPUTER SHARING SERVICES, INC.**

Headquarters Address : **2498 West Second Avenue, Denver, CO 80223**

Product Name : **EMPIRE**

Number of years commercially available : **One (1)**

Date of last up-date or improvement : **October, 1978**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Dan Walkovitz**

Telephone No.: **(303) 934-2381**

### **General Description**

**EMPIRE is a completely interactive system for both financial and non-financial applications in:**

- **Corporate Modeling**
- **Analysis**
- **Policy Evaluation**
- **Planning and Forecasting**
- **Report Generation**

**EMPIRE's versatility lies in its ability to analyze and simulate, answer questions about alternatives, and change data while the program is running. It's completely conversational and interactive. EMPIRE is easy to learn and to use because it speaks your language—English!**

**EMPIRE offers five extraordinary analysis options:**

- **SENSITIVITY ANALYSIS** tests the sensitivity of any element to changes in any other.
- **TARGET VALUE ANALYSIS** is a true breakthrough in corporate modeling. You may designate the value you want to achieve for any element in your model. EMPIRE will indicate the values needed for the other variables that will allow you to achieve your goal.
- **IMPACT ANALYSIS** identifies the amount of impact one element has on the other elements in your model.
- **"WHAT IF" ANALYSIS** helps you examine alternatives quickly and easily as you sit at your terminal.
- **RANDOM SIMULATION** uses Monte Carlo techniques to produce random values within the range you select. You may choose from four probability distributions, or specify your own.

**EMPIRE is a trademark of ADR Services, Inc.**

### **Special Features**

- **Forty functions and subroutines are built into EMPIRE. Among them are**
  - Continuous and discrete rate of return**
  - Present values for a single value or a series of values**
  - Depreciation — straight-line, declining balance, and switch-over option**
- **Curve-fitting routines evaluate your data against six types of curves to identify the best fit.**
- **The report writer in EMPIRE is so versatile that you can customize reports as you please.**
- **Graphics may be produced directly from EMPIRE data — line plots, bargraphs, even four-color plots!**
- **EMPIRE interfaces with STATPAC and IFS, the CSS statistical and forecasting packages.**

Company Name : **COMSHARE, INCORPORATED**

Headquarters Address : **P.O. Box 1588, Ann Arbor, MI 48106**

Product Name : **FCS**

Number of years commercially available : **Three (3)**

Date of last up-date or improvement : **Continuous**

Approximate number of current users : **350**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Christopher H. Greendale** Telephone No.: **(313) 994-4800**

## General Description

FCS is a corporate financial planning and control system which is available on COMSHARE's International timesharing network. Many business professionals use FCS for budget planning and control, market planning, cash flow forecasting, product planning, merger and acquisition analysis and consolidated reporting. Two-letter FCS commands are designed to be easily understood by professionals who have little or no experience with computers or financial modeling languages.

An integrated hierarchical database system allows for flexible data entry, maintenance and control.

FCS provides more than ninety functions most commonly used in building financial models. Model updates can be made quickly and easily. Temporary changes in the model can be made to test alternative strategies. FCS allows the user to ask "what if" questions by entering simple two-letter commands such as BI (for backward iteration, or goal seeking).

In addition to model building and analysis tools, FCS also provides more than sixty report formatting specifications for producing individualized formal reports.

COMSHARE financial specialists are available to FCS users for problem solving and system consulting.

## Special Features

- Integrated hierarchical database capabilities for flexible data input
- Temporary and permanent model changes without recompilation
- Flexible report capabilities
- Hierarchical consolidation
- Backward iteration (goal seeking)
- Line by line compilation
- Interactive and deferred processing modes
- COMSHARE Specialist Support
- Comprehensive documentation
- Time series forecasting, risk analysis and other statistical techniques
- Inflation accounting

Company Name : **COMSHARE LIMITED**

Headquarters Address : **230 Galaxy Boulevard, Rexdale, Ontario M9W 5R8**

Product Name : **CPMS-CORPORATE PLANNING AND MODELING SYSTEM**

Number of years commercially available : **Three (3)**

Date of last up-date or improvement : **October, 1978**

Approximate number of current users : **40**

Purchase price if available on in-house equipment : **Available on request**

Type(s) of equipment compatible for in-house use : **APL processor**

Headquarters contact : **Mr. John Lash** Telephone No.: **(416) 366-8111**

## General Description

CPMS provides for the modeling of an ongoing or existing operation (by including opening balance data), the modeling of individual projects, or a combination of the two. The consolidation of separate operating divisions is provided for, including the allocation of consolidated results back to divisions.

"What if" questions can be investigated by making changes to selected data and subtracting the base data model to produce delta reports.

Forecasts can be done based on a choice of one of eight types of regression equations including linear, exponential and geometric.

The system is highly interactive: all commands are simple English and all requirements for input and options are preceded by prompts.

The full range of programs in the COMSHARE APL libraries is immediately available to the CPMS user. Of particular use is access to the Statistics Canada CANSIM data base for forecasting purposes.

CPMS also includes a general purpose plotting routine which is capable of drawing lines to join data points on Diablo type terminals.

## Special Features

CPMS includes a standard financial model. It is a monthly sales driven model which calculates: cost of sales, sales taxes, inventories, payables, receivables, fixed assets, depreciation, capital cost allowance, income tax, deferred taxes, mortgage and loan interest and payments, and the effect of equity and government grants. These items can be broken down into more detailed categories if and when required. Standard reports provided are: Balance Sheet, Statement of Operations and Retained Earnings, Source and Application of Funds, and Cash Flow. Through use of data input sheets contained in the CPMS manual, start-up time for a standard model is two or three days.



Company Name : **CORE & CODE, INC.**

Headquarters Address : **7 Trinity Court, Wellesley, Massachusetts 02181**

Product Name : **BBL (BASIC BUSINESS LANGUAGE)**

Number of years commercially available : **Six (6)**

Date of last up-date or improvement : **November, 1978**

Approximate number of current users : **300**

Purchase price if available on in-house equipment : **\$24,000 (Lease available)**

Type(s) of equipment compatible for in-house use : **DECsystem-10, DECsystem-20, IBM 370**

Headquarters contact : **Peter E. Brumme**

Telephone No.: **(617) 237-4554**

## General Description

**BBL is a financial planning, analysis, and reporting language designed for managers and planners. It is a businessman's system that uses English commands and business terminology for the computerized preparation of financial reports.**

**BBL incorporates many features important to the modern financial planner, including:**

- Completely interactive, providing understandable on-line error detection which simplifies model development.
- Row/column arithmetic along with the capability to access individual elements within rows and columns, facilitating rapid report production.
- Single and multiple reports of any size which can be tailored to any format specifications.
- All logical and input/output capabilities of a flexible modeling language.
- Special capabilities for graphical output, financial calculations, management science functions, and statistical analysis.
- Chaining between separate models, which allows the planner to design a complete set of interrelated models, often useful in budget reporting systems, consolidations, and portfolio analyses.
- Complete alphabetic string manipulation capabilities.

## Special Features

**Of particular importance is that BBL is easy to learn and use. At the same time, it incorporates all the features of the BASIC language so that complex calculations and models can be easily developed. In addition, BBL includes:**

- Built-in editor
- Selective display of portions of a report
- Risk Analysis
- Imminent event simulation
- Extensive function library
- Simultaneous equations
- Low-cost "production mode" for high-volume applications
- Interface with data management systems
- Interface with FORTRAN, COBOL, etc.
- User-defined functions

Date: **January, 1979**

Submitted By: **Peter E. Brumme, Vice President**



Company Name : CUFFS PLANNING & MODELS, LTD.  
Headquarters Address : 444 E. 84th Street, Suite 10C, New York, NY 10028

Product Name : CUFFS-II  
Number of years commercially available : Five (5) (nationwide over several T/S services)  
Date of last up-date or improvement : September, 1978  
Approximate number of current users : 120  
Purchase price if available on in-house equipment : \$32,000 (also available on lease basis)  
Type(s) of equipment compatible for in-house use : DECsystem-10, DECsystem-20, IBM/370 (CMS & TSO)  
Headquarters contact : D. A. Combs Telephone No.: (212) 988-5695

## General Description

CUFFS-II is a financial modeling and forecasting system for the corporate planner with a need to develop his own models to meet both short and long term planning needs.

CUFFS' easy-to-use Modeling Language combines English, financial logic, and algebra in a natural way, producing a very usable model. Even those without knowledge of CUFFS can readily understand and improve complex models. CUFFS' powerful Command Language assists the planner in directing the execution of his model and in setting up complex consolidation processes.

CUFFS is easy to use because it automatically reorders equations into the proper calculation order, detects and solves simultaneous equations, and annualizes flows and ratios. CUFFS' conversational Command Language keeps the planner in close touch with his model. The CUFFS language allows calculation and financial logic of unlimited complexity. And, you can even include FORTRAN routines in a CUFFS model, thereby enabling any operation or calculation that can be done on a computer, including access to arbitrary data bases.

A CUFFS model can handle:

- Constraints on: capitalization, current ratios, interest coverage, etc.
- Currency conversion
- Exchange adjustments
- Discounted present value
- Internal rate of return, even with mixed positive and negative cash flows
- Regression
- Trend line calculations
- Logic and algebra of unlimited complexity

and much more. Over 700 built-in general financial routines. "What-if" capabilities include: run backwards to home in on desired results; testing alternative data interactively; exploring alternative logic and forecasting methods; and interactive questions designed by the user.

## Special Features

- Powerful command language (over 200 commands)
- Full report generator
- Plots & Histograms
- Expandable language, you may: define new commands, define new calculation functions, & call Fortran routines
- Powerful multi-level consolidations & eliminations (up to 500 subsidiaries, product lines, divisions...)
- Extensive data file capabilities
- Multiple sets of data in one file: may "drive" the model, may override formulas in model, & may create new accounts

According to CUFFS Planning & Models, Ltd., "CUFFS is used today for the simple reason that it is powerful enough to express complex financial logic, yet it is easy to use and it is easy to modify the model logic."





Company Name : INFORMATICS INCORPORATED - DATA SERVICES DIVISION

Headquarters Address : 6 Kingsbridge Road, Fairfield, NJ 07006

Product Name : SIMPLAN

Number of years commercially available : Three (3)

Date of last up-date or improvement : December, 1978

Approximate number of current users : 35

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Susan M. Clear

Telephone No.: (201) 575-2800

## General Description

**SIMPLAN** is a multi-purpose modeling system for financial analysis, forecasting, planning, budgeting, and management reporting. **SIMPLAN** can be easily mastered and put to work as a decision analysis tool by non-technical managers, professional planners, and financial analysts who have had no previous experience in computer modeling.

**SIMPLAN** integrates the following features into one user-oriented system:

- Database management
- Modeling language
- Statistical & Forecasting functions
- Report generator
- Flexible text editor
- Econometric modeling functions
- Division and subsidiary consolidations

The following are typical **SIMPLAN** applications:

- Budgeting
- Profit Planning
- Cash Management
- Revenue & Expenditure Forecasting
- Graphics Capability
- Sales Forecasting
- Market Analysis
- Product Planning
- Econometric Modeling
- Financial Analysis

## Special Features

- Options for batch or interactive use
- A non-technical, user-oriented command language
- Full logical testing and GO TO modeling language elements
- Multiple data consolidation capabilities
- Password security over data, models, and report programs
- Wide selection of techniques for time series analysis & forecasting (e.g. trend analysis, multiple and two-stage least squares regression, triple exponential smoothing, adaptive forecasting)
- Simultaneous equation modeling
- A flexible text editor for defining and modifying models and reports
- Report generator enabling user to produce customized reports in virtually any format
- Ability to execute user-written routines from within a **SIMPLAN** model
- Access to NBER Time-Series Databank

Company Name : **INTERACTIVE DATA CORPORATION, Dynamics Associates Division**

Headquarters Address : **1033 Massachusetts Avenue, Cambridge, MA 02138**

Product Name : **XSIM**

Number of years commercially available : **Nine (9)**

Date of last up-date or improvement : **September, 1978**

Approximate number of current users : **500**

Purchase price if available on in-house equipment : **Prices available upon request**

Type(s) of equipment compatible for in-house use : **IBM, Amdahl, ITEL**

Headquarters contact : **Robert B. Anthonyson, VP/Marketing**

Telephone No.: **(617) 492-7500**

## General Description

**XSIM is the complete and integrated language for economic and financial modeling and planning. It is a flexible, easy to use, conversational system that also offers a complete programming capability. This unique system integrates complete data analysis and data display capabilities with access to private or public databases, including economic, financial, and corporate information.**

**XSIM is particularly suited to these three application areas:**

**FINANCIAL MODELING AND SIMULATION** - The modeling and simulation facility is useful in budgeting, pro forma analysis, financial planning, and econometric forecasting. XSIM models use simple, straightforward equations to represent all types of financial economic, and marketing relationships.

**ECONOMETRICS** - XSIM provides a complete set of techniques for formulating and estimating forecasting models:

- Regression analysis (multiple, stepwise)
- Specialized econometric procedures (autoregressive correction, distributed lag estimation)
- Box-Jenkins time series analysis, exponential smoothing
- Seasonal adjustment (using the X11 variant of Census Method II)
- Nonlinear and generalized least squares estimation

**SECURITIES ANALYSIS** - Through a subsystem called XSCAN, XSIM provides specialized tools for securities analyses—industry analyses, merger-acquisition analyses, investment analyses, and corporate performance studies.

## Special Features

**GENERAL DATA ANALYSIS** - XSIM is a comprehensive data analysis language, including facilities for:

- Screening and sorting
- Computing discounted cash flows, internal rates of return, and a wide variety of other financial measurements
- Performing econometric and statistical analyses

**REPORTS AND GRAPHS** - Unique capabilities for report generation in XSIM range from the quick and easy to the very detailed. XSIM reports are attractive, well formatted, and suitable for presentation to the highest levels of management. XSIM also provides line graphs, bar graphs, pie charts, and scatter diagrams to suit your most explicit format requirements.



Company Name : I. P. SHARP ASSOCIATES LIMITED  
Headquarters Address : 145 King Street West, Toronto, Canada

Product Name : AIDS  
Number of years commercially available : Five (5)  
Date of last up-date or improvement : November, 1978  
Approximate number of current users : 100  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Rosanne Wild Telephone No.: (416) 364-5361

### General Description

AIDS is a computer-based system of concepts, commands, procedures and instructions which provides planners and decision-makers with a facility for designing and evaluating alternative strategies and tactics and for monitoring performance with respect to plans.

AIDS is an approach designed for planners. It allows you to specify in a detailed manner, the interrelationship between planning variables, and rapid implementation and modification of corporate models and printing programs.

The system is the product of an extensive applied research program in the field of planning and control technology. As a result, it is applicable to a wide variety of decision areas, a few of which are:

- Long-range planning
- Project feasibility studies
- Venture investment analysis
- Merger/Acquisition/Divestiture evaluations
- Development of annual plans and budgets and the monitoring of their performance
- Consolidation of financial statements

Since generally released in January 1974, AIDS has enjoyed widespread usage within industry in the United States, Canada and Europe. The system was described in detail in the March 1974 issue of "EDP In-Depth Reports" and is one of the most sophisticated Corporate Planning systems currently available.

### Special Features

- Operates with multiple databases
- Complex Corporate/Divisional/Departmental structures are assisted by automated consolidation features
- Batch or interactive production allows stress on economy or immediate results
- The SHARP APL language encourages fast development of flexible models
- Easy interface with economic and industrial data bases such as NBER and Civil Aviation
- Sensitivity Analysis and hundreds of proven statistical and financial modules are optionally incorporated
- Offers an easy to learn mnemonic, intuitive command language
- Provides sophisticated report generator and plotting facilities



Company Name : MATHEMATICA PRODUCTS GROUP

Headquarters Address : P.O. Box 2392, Princeton, NJ 08540

Product Name : RAMIS II

Number of years commercially available : Eight (8)

Date of last up-date or improvement : June, 1978

Approximate number of current users : 1,000

Purchase price if available on in-house equipment : From \$22,000

Type(s) of equipment compatible for in-house use : IBM 360/370

Headquarters contact : Mark Berkowitz or Frank Fish

Telephone No.: (609) 799-2600

## General Description

RAMIS II completely integrates a user-oriented, English-like programming language with a comprehensive DBMS. The RAMIS II DFO (Directed Format Option) is specifically designed to add a financial modeling capability to its data base management and report writing capabilities.

To use DFO one inputs a financial model's row and column relationships into a simple data file maintained by standard RAMIS II facilities. Elements of the matrix can be constants, data elements selected from the data base, or elements in other rows or columns. Elements may be referred to as absolute matrix elements or by their relative column numbers. Each column of the model may thus be specified as having the same computational rules as other columns or it may have its own unique rules. The system is designed to minimize the data to be entered to specify the model. DFO encompasses a wide range of formatting functions to provide highly readable reports. Typically these reports take the form of balance sheets, income statements, cash flow, budgets, etc.

The model is triggered by requesting a report that will provide data elements to the model and specify columns. Columns may be different time periods, actuals, budgets, YTD, or any other standard financial categories. Standard RAMIS II features can be used to quickly specify selection criteria, change variables to perform "what if" analyses, or request detail or consolidated reports.

## Special Features

- The modeling language utilizes the RAMIS II DBMS and may operate on data files of unlimited size.
- The modeling language can be used in conjunction with standard RAMIS II reporting, which provides both tabular and graphic outputs on the base data.
- Model results can be stored in the RAMIS II data base and reported on to give across-case comparisons or they can be used in subsequent models.

Company Name : MCDONNELL DOUGLAS AUTOMATION COMPANY (MCAUTO)

Headquarters Address : P. O. Box 516, St. Louis, MO 63166

Product Name : AUTOPLAN

Number of years commercially available : Six (6)

Date of last up-date or improvement : November, 1978

Approximate number of current users : Over 300

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : M. J. Malls

Telephone No.: (213) 593-6271

## General Description

AUTOPLAN, as a tool for business planning and modeling, can be used for any application involving tables and numbers. MCAUTO offers AUTOPLAN on its nationwide teleprocessing network to handle applications such as long and short range planning, budgets, budget analysis, investment analysis, and engineering tabulations.

A "table description" of your model is created using reserved English keywords and an easy-to-understand format. The simplicity of the table description lets you set your own procedures. Your thoughts go directly from you to the computer, via the table description. If changes are necessary, simply make the changes to the table description and the computer provides you with the updated report.

AUTOPLAN allows you to produce plans, models and graphs in minutes instead of days, examine planning alternatives and "What-If" assumptions analyze alternatives with personally selected alternatives, evaluate the ripple effect of one or more changes, and decide which course of action should be taken.

AUTOPLAN is available on the machine service best suited to you; TSO, 370 Remote Batch Service, or VM/CMS.

## Special Features

- AUTOPLAN users can prepare input into MCAUTO's statistical library STATPAK
- The AUTOPLAN/AUTOCOUNTANT interface provides for AUTOPLAN prepared budgets to be established in the General Ledger Budgeting Module
- User exits allow interface with your application
- "What-If" capability allows you to analyze the effects of changes to your model. A separate report will be produced for each "What-If" requested
- The interactive input facility allows you to enter variable information at execution
- Good looking reports are formatted automatically
- Lower level reports may be consolidated to produce a single high level projection
- All standard arithmetic calculations are performed
- Graphic capabilities on your printer; extended call capabilities, including 8 depreciation methods
- Display of user diagnostics

Date: January, 1979

Submitted By: J. F. Matuscak, Manager, Product Planning



Company Name : MELLONICS INFORMATION CENTER, Litton Systems, Inc.

Headquarters Address : 6701 Varlei Avenue, Canoga Park, CA 91303

Product Name : FORESIGHT

Number of years commercially available : Nine (9)

Date of last up-date or improvement :

Approximate number of current users : 750 worldwide

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use : IBM 3033

Headquarters contact : John L. Cudworth

Telephone No.: (213) 887-5100

### General Description

FORESIGHT is a business planning tool and a Financial Modeling Language. The program provides ready access to high speed computers through English language commands. It is easy to learn and use, with no programming knowledge required.

FORESIGHT is capable of being used efficiently for management reports and financial reporting. FORESIGHT can accept simple or complex changes to plans and automatically produce new sets of reports with details of the impact of change.

Using FORESIGHT you can evaluate alternative courses of action, analyze the impact of costs against sales, revenue, or any other planning base test the impact of changing conditions in your firm or industry.

Self documentation of all the model logic, relationships, and data may automatically be printed.

The same program can be used in a time sharing, remote job entry, or batch environment, depending on the MODE command.

### Special Features

- **CONSOLIDATION** - By entire models, reports, selected lines or columns. Models can be added (ACQUIRE) to one another or subtracted (DIVEST) from one another in whole or in part.
- **DATA BASE** - History files for retrieval, update and modification of models.
- **DATAIN-DATAOUT** - Permits interaction with other files or programs. EXIT allows inclusion of user subroutines.
- **DISPLAY WORKSHEET/UPDATE PROMPTER** - Automatically produces input forms and user prompts for model updating.
- **FINANCIAL ROUTINES** - Amortize, annuity, depreciation, present value, rate of return and spread.
- **LOGICAL AND ARITHMETIC OPERATIONS** - Includes condition IF, branching, AND/OR ELSE, GO TO, as well as the conventional arithmetic operations (+, -, x, /).
- **OUTPUT REPORTING** - Automatic fixed report writer and flexible variable report writer.
- **STATISTICAL FORECASTING** - Linear regression, projection, simple and double exponential smoothing, seasonality, learning curves. Single and multivariate regression. Linear and hyperbolic confidence bonds.





Company Name : MELLONICS INFORMATION CENTER, Litton Systems, Inc.

Headquarters Address : 6701 Varlei Avenue, Canoga Park, CA 91303

Product Name : RAMIS II

Number of years commercially available :

Date of last up-date or improvement :

Approximate number of current users : n.a.

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use : IBM 3033

Headquarters contact : John L. Cudworth

Telephone No.: (213) 887-5100

### General Description

RAMIS is a combination of an efficient and easy-to-use data base management system and a unique free form report preparation system which significantly reduces programming time.

MIC offers RAMIS with all of its options, providing the resources required for the design and operation of information systems in an on-line time-sharing, or batch environment.

Complete facilities for data base management are included. Reports are generated in response to user requests written in a non-procedural language, whose statements are understandable English words and sentences.

RAMIS II provides data independence. The exact location and arrangement of data on the storage media and changes to the data storage structure do not affect current applications by the user.

### Special Features

- **REPORT PREPARATION FEATURES** - Reporting from RAMIS files and non-RAMIS external files; Tabular reports and graphical equivalents obtained in one data base pass; Report models can be stored to interact with a report request; Report models are stored once; Balance sheets, P & L statements, and any comparative financial reports can be produced; Each report line can contain: data from the data file, data from the report mode, the result of a calculation on prior lines, and/or text information; Each report line can: be displayed optionally if data is present, or be used for computation only and printed; Calculation capabilities include: row to row, column to column, row-column element, and special functions.
- **DATA BASE FEATURES** - Hierarchical and network structures; Security based on: scrambled passwords, file passwords, level passwords, data-item access control.
- **RECORDS MANAGEMENT FEATURES** - Data items can be updated either by replacement or accumulation.
- **SYSTEM FEATURES** - Procedures can be executed with batch or interactive mode; Procedures can be catalogued for subsequent or repetitive use.



Company Name : **METROCOM INC.**Headquarters Address : **1500 Southern Nat'l. Center, 200 S. College St., Charlotte, NC 28202**Product Name : **FINMOD**Number of years commercially available : **Two (2)**Date of last up-date or improvement : **January, 1978**Approximate number of current users : **40**Purchase price if available on in-house equipment : **n.a.**Type(s) of equipment compatible for in-house use : **n.a.**Headquarters contact : **E. E. Mason**Telephone No.: **(704) 374-1990**

### General Description

**FINMOD** is a tool for business and financial planning and modeling that can be used for any application involving manipulation of tables of numbers. Metrocom offers **FINMOD** on its nation-wide time-sharing network to handle such applications as: budgets and budget analysis; balance sheet projections; capital outlay evaluations; cash flow projections; cost analysis and variance; cost estimating; depreciation schedules; engineering tabulations; income and expense projections; investment analysis; long-range and short-range planning; manpower allocations; market research tabulations; marketing projections; new product planning; performance comparisons; salary planning.

The variety of tables and reports that you can produce is limited only by your applications and your imagination. You define your own rules and create your own procedures. If you need to make changes, simply make the changes to the tables and **FINMOD** produces the updated reports.

**FINMOD** allows you to apply a standard methodology to:

- Evaluate multiple alternative financial plans with comparisons between plans in minutes, instead of days or weeks.
- Examine "What If" assumptions over a wide range of possible alternatives.
- Evaluate the effects of multiple changes.
- Decide on courses of action based on an analysis of alternatives.
- Evaluate the potential risk of a project through sensitivity analyses.
- Generate hierarchical consolidations.
- Generate percentage and variance reports.

### Special Features

The same calculation logic and printing specifications can be used for many sets of data, as in departmental budgeting, or several sets of calculation logic and print specifications can be prepared for a given set of input data such as to examine the effects of various assumptions.

Similar projections can be consolidated into a single total, or the projections can be consolidated in a hierarchical manner, providing subtotal reports at each intermediate level of consolidation.

Subsets of rows and columns may be selected for reporting, and these subsets may vary for each calculation.

**FINMOD** provides procedures to build and maintain historical, projection, and combination historical/projection data files. Reports may be obtained from single files or from groups of files. The results of any calculation may be saved if desired.

Company Name : **NATIONAL CSS, INC.**

Headquarters Address : **187 Danbury Road, Wilton, CT 06897**

Product Name : **EMS, Economic Modeling System**

Number of years commercially available : **5**

Date of last up-date or improvement : **June 1, 1979**

Approximate number of current users : **100**

Purchase price if available on in-house equipment : **Negotiable**

Type(s) of equipment compatible for in-house use : **IBM 370/15X, 16X; 303X; Amdahl**

Headquarters contact : **Barry M. Gross, Product Manager** Telephone No.: **(203) 762-2511**

## General Description

EMS is a unique financial planning and forecasting system which integrates into one comprehensive package capabilities for data management, statistical analysis modeling, forecasting, report writing and graphics. English language commands form a consistent pattern which facilitates learning by both the novice and the advanced user. Customized and black-box applications can easily be developed and programmed by EMS for either interactive or batch operation.

### Key features of EMS include:

- Access historical and forecasted data for foreign exchange, financial, economic and demographic series.
- Access Merrill Lynch Economics macro, regional and industry models.
- User's models are reordered automatically in any combination of recursive and/or simultaneous blocks. Reverse iteration and what if simulations are run automatically without manually restructuring the model.
- Forecasting applications include regression and time series: Hildreth-Lu, cross sectional pooling, nonlinear regression, seemingly unrelated, generalized least squares, random coefficient, Box-Cox, moving averages, constrained regression, X-11/X-11Q, Polynomial distributed lags, Box Jenkins, ridge.
- Financial applications for analysis of: capital budgeting, risk, discounted cash flow, ROI, monte carlo, depreciation, stochastic dominance, interest, sensitivity analysis, equity return, merger and acquisition, lease versus buy.
- Financial reports can be easily generated with any desired format, margins and column headings. All reports feature an automatic and unlimited consolidation option for any interval.
- Graphing and plotting in a variety of formats at the user's terminal, printer or plotter.

EMS is the proprietary product of Economic Sciences Corporation and is exclusively available on the National CSS network.

## Special Features

- Exclusive affiliation with Merrill Lynch Economics for: economic and financial data, forecasting of short and longrun macro regional and industry models, consulting services
- External databases include: Merrill Lynch Economics, FDIC/SLIC, Securities, Valueline, Energy, California Regional Data Bank
- Complete security of all operations and data by both user ID and protect execs.
- Local support, documentation and training at the user's convenience in 33 major cities, England and France
- Built in editor for revising and updating all user applications
- Interface with other systems for complex graphics and data base management
- Exhaustive database facilities for constructing and maintaining large corporate information systems including grouping and selective retrieval systems
- Specialized modeling and simulation features for constructing and executing large corporate models





Company Name : RAPIDATA, INC.  
Headquarters Address : 20 New Dutch Lane, Fairfield, NJ 07006

Product Name : FISCAL  
Number of years commercially available : 3½  
Date of last up-date or improvement : Ongoing  
Approximate number of current users : 300  
Purchase price if available on in-house equipment : Price available upon request  
Type(s) of equipment compatible for in-house use : DEC 10 Systems  
Headquarters contact : Charles Krempa, Marketing Manager  
Telephone No.: (201) 227-0035

## General Description

FISCAL is a totally integrated system for organizing, manipulating, analyzing and reporting financial information.

- FISCAL is a Report Writer - Report formats can be tailored to the data during execution. Headings for titles, columns, and accounts can be variable and redefined during execution. Ranking reports can be produced through built-in sorting of output. Alpha text can be inserted anywhere in the report, and account headings can be optionally displayed to the left, to the right or in the middle of a report.
- FISCAL is a Command Language - Numerous commands permit interactive control at every step of the modeling process such as: reporting, testing new values, performing calculations, entering data, evaluating assumptions through "what if" facilities, and performing sensitivity analyses given desired values.
- FISCAL is Data Management - An environment, resembling a complex corporate organization, is provided for the sharing of data among many users through specialized create, access, update, and maintenance commands.
- FISCAL is Powerful and Easy - Its procedures statements can operate automatically on whole series of data, while its logic is unlimited through total integration with Fortran. FISCAL's flexibility offers both the experienced and inexperienced computer user the opportunity to produce sophisticated solutions.

## Special Features

### FISCAL is:

- Financial Routines: Such as present value, internal rate of return, loan amortization, depreciation, and consolidation.
- Graphics: On various user terminals, plotters and Rapidata plotters in a vast assortment of plot options (bar, curve, spike...).
- Statistical Analysis: Techniques extend from standard statistical routines through univariate Box-Jenkins to multivariate State Space Forecasting.
- Projection Package: Routines include seasonality, growth rate, moving average, simple linear and exponential least squares regression, and a collection of approximately 25 generalized forecasting methods.
- Data Interface: Data can be included in the model, entered on-line, entered from previously prepared files, or outputted to files for use in other models.



Company Name : **RAPIDATA, INC.**

Headquarters Address : **20 New Dutch Lane, Fairfield, NJ 07006**

Product Name : **PROBE**

Number of years commercially available : **6½**

Date of last up-date or improvement : **Continuous**

Approximate number of current users : **1700**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Charles Krempa, Marketing Manager** Telephone No.: **(201) 227-0035**

### General Description

**PROBE** is a generalized system for information management, analysis, forecasting and presentation. Particularly well suited for the development of financial data management systems, **PROBE** is now being used by planners, market research analysts, economists, and statisticians for a wide variety of financial, industrial and governmental applications.

**PROBE** provides easy access to client data, either alone or in conjunction with over 150,000 financial, economic and market research data series. In interactive mode, **PROBE** provides an extremely straightforward, easy-to-use method for ad hoc retrieval, analysis and reporting. Command file mode provides the ability for preparing large-scale systems for financial modeling and analysis. In addition to a wide variety of capabilities, user-developed analytic systems written in any computer language may be integrated into **PROBE** analyses.

**PROBE** includes unique capabilities for analyzing the same data from several different points of view. For applications involving general reporting, graphics, seasonal analysis and forecasting, **PROBE** provides a wide variety of time series analysis capabilities. Without having to re-enter the data, the same information may also be analyzed cross-sectionally for such applications as performance analysis and inter-divisional comparisons.

**PROBE/DM**, the data base management facility for **PROBE**, makes management data truly accessible to the decision maker. Highly structured data bases which reflect the user's organizational structure (e.g., sales rep within office grouped by region, etc.) can be created interactively in minutes. Single commands allow ad hoc retrieval and reporting of information either as time series or cross-sectionally. Automatic consolidation either by data base level or by data makes it easy and convenient to prepare summary reports.

**PROBE** provides a wide variety of built-in regression and other statistical analysis techniques. Equations may be defined directly or passed from the regression routines to a generalized model simulator, for recursive, simultaneous or block recursive financial modeling.

### Special Features

- **DATA MANAGEMENT** - A wide variety of capabilities to suit the application, ranging from single-variable, listable data files to random access or hierarchical data bases of unlimited capacity for large-scale financial modeling systems.
- **GRAPHICS** - Complete interactive graphics capabilities for standard terminals, user plotters and plotting terminals and remote-access Rapidata plotters.
- **REPORT PREPARATION** - Built-in report-preparation capabilities, plus direct access to a generalized financial reporting system provide the ability to easily and efficiently generate reports of any desired complexity. Financial functions such as depreciation and ROI can be combined with **PROBE**'s forecasting and statistical techniques to prepare financial reports and analyses.
- **FORECASTING & ANALYSIS** - **PROBE** provides a wide variety of built-in forecasting techniques, including classical decomposition (XII/QII), exponential smoothing, Winters forecasting, Box-Jenkins, and Rapidata's unique multivariate State Space Forecasting system.



Company Name : ROSS SYSTEMS, INC.

Headquarters Address : 1900 Embarcadero Road, Suite 208, Palo Alto, CA 94303

Product Name : MAPS

Number of years commercially available : Four (4)

Date of last up-date or improvement : September, 1978

Approximate number of current users : Extensive

Purchase price if available on in-house equipment : \$15,000 (single CPU License)

Type(s) of equipment compatible for in-house use : DEC-PDP-11, DECSYSTEM-20

Headquarters contact : Ed Harley

Telephone No.: (415) 326-1054

### General Description

MAPS (Management Aid for Planning Strategies) was the first nationally recognized financial modeling and reporting language to be made available on a mini-computer. MAPS offers the same functionality (speed, features and capacity) as those products offered by most of the large timesharing firms, at a greatly reduced price. MAPS is available worldwide on the ROSS SYSTEMS timesharing network or can be purchased as a package to operate on a PDP-11 computer in-house.

Functionally, MAPS contains the features and usability found in the best planning languages today. In addition, all planning systems work in conjunction with the host computer operating system and MAPS utilizes the full capabilities of DEC's RSTS/E and BASIC-PLUS, the most widely used and functional timeshared operating system available.

MAPS was first released in April, 1975 and has had four years of usage and enhancements. MAPS is the major planning tool used by 2 of the 15 largest banks in the country, many of the major semiconductor manufacturing firms and a number of the top leasing/financial services firms.

MAPS and MAPS customers are supported by ROSS SYSTEMS, INC., a professional management consulting and computer service firm with extensive experience in all aspects of planning. ROSS SYSTEMS is committed to providing a continued high level of professional support to its customers and to its software products.

### Special Features

- 1024 Rows by 100 column capacity
- 17 Digit decimal precision (8 optional)
- Nested command files
- An integrated ISAM data-base facility
- Binary files
- Formatted ASCII files
- Statistical and financial functions
- IF-THEN-ELSE-/GOTO/GOSUB Logic facilities
- User can build his own functions
- "What if" capabilities
- Flexible report writer





Company Name : **SERVICE BUREAU COMPANY**

Headquarters Address : **500 West Putnam Avenue, Greenwich, CT 06830**

Product Name : **PROPHIT II**

Number of years commercially available : **Over 6**

Date of last up-date or improvement : **Continuous**

Approximate number of current users : **Over 2500**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Contact your local SBC Time-Sharing Office** Telephone No.:

### General Description

**PROPHIT II is a comprehensive "Planning/Analysis/Modeling/Reporting" system available only on SBC's CALL/370 Time-Sharing Service. With over 2500 users in the U.S. (plus many in Canada, Europe and Japan). PROPHIT II is the most widely used system of its type today.**

**The characteristics of PROPHIT II include:**

- **EASE OF USE.** It is designed for the business user who has no knowledge of computer programming, but who has non-trivial applications.
- **FROM SIMPLE TO COMPREHENSIVE.** It has many levels of facility. Thus the novice can obtain useful results quickly and progress with experience, while the experienced analyst can construct highly sophisticated reporting and analysis systems (complex models may be several thousand lines).
- **EXTENSIVE SUPPORT.** Documentation is clear and thorough. User classes and executive seminars are regularly conducted at all SBC locations. Marketing and systems representatives are available in all major cities. "On-Line Bulletins" are provided to immediately advise all users of enhancements to the system. (Enhancements to PROPHIT II are made continually, but always in such a way to avoid disturbing existing users' models.)
- **EXTENSIVE "COMPARATIVE ANALYSIS REPORTING."** With a few simple commands, entire reports can be transformed into other forms to highlight relationships and comparisons. For example: RATIOS of all columns to a base column. PERCENT OF CHANGE from one column to another. RATIOS of lines to other lines. ARITHMETIC OPERATIONS between columns.
- **FULL RANGE OF CONSOLIDATIONS AND SUMMARIES.**
- **"WHAT-IF" SUPPORTED BY "Sensitivity Reporting."**
- **Special modeling capabilities for handling "Time-phased consolidation", "Scheduling Modeling", etc. situations.**
- **Extensive capabilities for iterative model processing including situations involving goal seeking, balancing, optimization and simultaneous equations.**
- **EXTENSIVE GRAPHICS CAPABILITY (See below).**

### Special Features

**PROPHIT II's range of functions is significantly expanded by the fact that it is HIGHLY COMPATIBLE with the other systems in CALL/370's "Business Information Services for Planning, Analysis, and Control" (BIS-PAC). These include: MINI-MIS (especially the new "MMX") - for inquiry, reporting, and data management; RISKAN II - for risk analysis; DATAPACK - for statistical analyses; TIMEPACK II - for a complete range of time-series analysis and forecasting tools, ranging from the most simple through sophisticated X-11 and Box-Jenkins techniques.**

**Especially significant is the link from PROPHIT II to PICTURE-PAC for easily preparing many different kinds of attractive plots and graphs. These may be printed on the same terminal used to type reports for maximum convenience, or, on a pen-plotter to produce a stunning variety of MULTICOLOR charts; on paper or on projection transparencies. In either case NO PROGRAMMING is required.**



Company Name : **SCIENTIFIC TIME SHARING CORPORATION**

Headquarters Address : **7316 Wisconsin Avenue, Bethesda, MD 20014**

Product Name : **APL\*PLUS ECONOMETRIC PLANNING LANGUAGE**

Number of years commercially available : **One (1)**

Date of last up-date or improvement : **January, 1978**

Approximate number of current users : **20**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Paul A. Tava**

Telephone No.: **(914) 428-6910**

## General Description

The APL\*PLUS Econometric Planning Language is a version of IBM's APL based EPLAN language. This system is directly interfaced with the Financial Planning System (FPS).

Scientific's EPLAN (Econometric Planning Language) Subsystem offers the following tools for complete econometric modeling:

- Time-series, cross-sectional observations, equations or complete models can be analyzed
- Time-series defined and handled as yearly, semi-yearly, quarterly, monthly or weekly data
- Operators included: add, subtract, multiply, divide, log, exponential, sine, etc.
- Special econometric modelling operators such as: shifts, first-difference, first-quotient, rectangular, and normal distribution and periodicity of a time-series
- For linear models the following estimation techniques: ordinary least squares, generalized least squares, two stage least squares, principal components substitution, polynomial distribution lags
- The results include: coefficient value, standard error of the coefficient, t-value, F statistic, standard error of the regression,  $R^2$  statistic, Durbin-Watson statistic
- Simultaneous equations models which can be non-linear are solved by means of the Gauss-Seidel Method
- Van Der Giessen's algorithm is used to reorder equations
- Also included are plotting and displaying routines

## Special Features

Completely written in APL\*PLUS language making it modifiable and integrated with all STSC software packages.



Company Name : **SCIENTIFIC TIME SHARING CORPORATION**

Headquarters Address : **7316 Wisconsin Avenue, Bethesda, MD 20014**

Product Name : **APL\*PLUS FINANCIAL PLANNING SYSTEM**

Number of years commercially available : **Four (4)**

Date of last up-date or improvement : **April, 1978**

Approximate number of current users : **250**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Paul A. Tava**

Telephone No.: **(914) 428-6910**

### General Description

The APL\*PLUS Financial Planning System (FPS) is a totally integrated database oriented, financial modeling system. FPS is written in the APL\*PLUS language and employs subroutines with English-like names, such as SUM, CUM, EQ, ANS, etc.

The APL\*PLUS language and the availability of comprehensive libraries of financial, statistical and forecasting programs shortens model development time tenfold or more. Moreover, users can add to or modify all modules of the FPS system and can intersperse native APL language commands and subroutines as desired.

The database features in FPS include unlimited model size — up to 200 years in a choice of monthly, quarterly or yearly terms; unlimited storage capacity; security of proprietary data; ability to share files with any number of users; and the functions needed to construct consolidation models that duplicate exactly the corporations' financial structure. The consolidation features include automatic inter-company eliminations, currency conversion and the ability to move data between corporate and divisional databases.

FPS offers a variety of graphic presentation formats, including classical reports, horizontal and vertical time axis tabulations, time oriented plots, X vs. Y plots, frequency plots and high speed, large volume file printing capability. The FPS report generator features time horizon analyses such as first differences, percent differences, averages, and annualized growth rates and fractions.

Models can automatically switch into time-phased processing mode, solve simultaneous equations or be iterated by user defined searching techniques.

### Special Features

- **Sensitivity Testing:** The user can specify a range of values for any set of model elements and, by varying them, study the effect on the model results. Individual runs or complete scenarios can be modeled.
- **Value Seeking:** The system can automatically solve for the value of any selected parameter, or maximize or minimize any result value in the model.
- **Risk Analysis:** Lets the user construct Monte Carlo simulation models with the same programs used for deterministic modeling. Data can be sampled from 30 different analytical distributions and 7 empirical distributions with cross correlations, autoregressive time series and time series scaling using distributions with different variances for each period.
- **Advance Statistical Techniques:** A suite of statistical analysis functions, linear programming software, trend analysis programs, forecasting routines and econometric modeling software.
- **Econometric Modeling Subsystem:** See STSC's EPLAN language.



Company Name : **TIMESHARING CONSULTANTS, INC.**

Headquarters Address : **4400 East Broadway, Suite 606, Tucson, AZ 85711**

Product Name : **BUDGETING & PLANNING SYSTEM (BPS-20)**

Number of years commercially available : **Over Two (2)**

Date of last up-date or improvement : **August, 1978**

Approximate number of current users : **Confidential**

Purchase price if available on in-house equipment : **\$10,000**

Type(s) of equipment compatible for in-house use : **DECsystem-20**

Headquarters contact : **M. Ernest Huber**

Telephone No.: **(602) 881-8888**

### **General Description**

**BPS-20 is an easy-to-use system that enables planners, analysts and managers to quickly create reports on a remote computer terminal. It is extremely useful for budgeting, projecting, consolidations, financial planning, cash flow and modeling.**

**Nearly any tabular report that is made up of columns of numbers and item or account names on the left margin can be readily generated using BPS-20. Results can be previewed and assumptions changed as often as necessary. Major BPS-20 features are:**

- **Report computations are unlimited**
- **The user has complete control over format and computations**
- **Multiple reports can be printed on a single run**
- **Output may be directed to your terminal or to disk for printing on a high speed printer**
- **Variable format may be used on each report**
- **Page headings are automatically centered**
- **Column headings are easily specified by the user**
- **Complete flexibility for underlining and spacing**

### **Special Features**

- **Easy-to-use english-like commands are used**
- **Functions are provided to compute:**
  - Depreciation**
  - Present Value**
  - Rate of Return**
- **Data files can be created and used by other programs**
- **Data files created by other programs can be used by PBS-20**
- **Multiple variables allow rapid testing of "What If?" questions**
- **Highly flexible report generator**
- **Password security over data, models and report programs**
- **Unlimited consolidations**



Company Name : TYMSHARE, INC.  
Headquarters Address : 20705 Valley Green Drive, Cupertino, CA 95014

Product Name : BBL (Basic Business Language)  
Number of years commercially available : 5  
Date of last up-date or improvement : January, 1978  
Approximate number of current users : 300  
Purchase price if available on in-house equipment : \$24,000  
Type(s) of equipment compatible for in-house use : DECsystem-10  
Headquarters contact : Tom Abbott  
Telephone No.: (408) 446-6000

## General Description

BBL is a financial planning, analysis, and reporting language designed for managers and planners. It is a businessman's system that uses English commands and business terminology for the computerized preparation of financial reports.

BBL incorporates many features important to the modern financial planner, including:

- Completely interactive, providing understandable on-line error detection which simplifies model development.
- Row/column arithmetic along with the capability to access individual elements within rows and columns, facilitating rapid report production.
- Single and multiple reports of any size which can be tailored to any formal specifications.
- All logical and input/output capabilities of a flexible modeling language.
- Special capabilities for graphical output, financial calculations, management science functions, and statistical analysis.
- Chaining between separate models, which allows the planner to design a complete set of interrelated models, often useful in budget reporting systems, consolidations, and portfolio analyses.
- Complete alphabetic string manipulation capabilities.

## Special Features

Of particular importance is that BBL is easy to learn and use. At the same time, it incorporates all the features of the BASIC language so that complex calculations and models can be easily developed. In addition, BBL includes:

- Built-in editor
- Selective display of portions of a report
- Risk Analysis
- Imminent event simulation
- Extensive function library
- Simultaneous equations
- Low-cost "production mode" for high-volume applications
- Interface with data management systems
- Interface with FORTRAN, COBOL, etc.
- User-defined functions

Company Name : **TYMSHARE, INC.**

Headquarters Address : **20705 Valley Green Drive, Cupertino, California 95014**

Product Name : **EXPRESS**

Number of years commercially available : **Three (3)**

Date of last up-date or improvement : **Continuous**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Tom Abbott** Telephone No.: **(408) 446-6000**

## General Description

**EXPRESS**, available on the Tymshare TYMCOM-370, is a unique system developed by Management Decision Systems, Inc., Weston, Massachusetts, for on-line information analysis and display, providing the decision maker with a full repertoire of information analysis tools for problem solving. It is unique because it offers key capabilities typically found in assorted other computer systems and programs within a single, integrated, user-oriented environment. **EXPRESS** is used for a wide variety of applications including sales reporting, market research analysis, cost/budget analysis, demographic studies, lease analysis, and market promotion study. Whether the user requires mathematical computations, statistics, sophisticated forecasting techniques, exception reporting, or cross-tabulation, he can perform it in **EXPRESS**.

### **EXPRESS is:**

- **Easy to use.** A user can begin work immediately in **EXPRESS** with a highly interactive subset of the commands.
- **Able to handle large problems:** **EXPRESS** can accommodate data bases significantly larger than any allowed by other interactive systems.
- **Flexible.** Each user can define his own reporting formats and analysis procedures and make them available through simple commands. New data can always be added, new commands can be defined, and changes can be made to existing user-defined procedures.

## Special Features

- **Data base definition, creation, management, and expansion**
- **Extensive information display techniques including ad hoc table generation**
- **An exception reporting mechanism**
- **A complete formal report generator**
- **Extensive graphics capability, including support of most graphics terminals**
- **Direct mathematical manipulation without programming**
- **Statistical library**
- **Financial functions**
- **Interface to FORTRAN and BAL**
- **Access to NBER data base**



Company Name : **UNITED COMPUTING SYSTEMS, INC.**

Headquarters Address : **2525 Washington Avenue, Kansas City, MO 64108**

Product Name : **FORESIGHT**

Number of years commercially available : **Ten (10)**

Date of last up-date or improvement : **December, 1978**

Approximate number of current users : **800 worldwide**

Purchase price if available on in-house equipment : **\$30,000<sup>1</sup>**

Type(s) of equipment compatible for in-house use : **2**

Headquarters contact : **3**

Telephone No.: **(816) 221-9700**

### General Description

**FORESIGHT** is not only a Financial Modeling Language, it has also been developed into a Business application Language, one that is capable of being efficiently used in a production environment for periodic management reports and comprehensive financial reporting systems, with special emphasis on data entry, data manipulation, and reporting. The December, 1978 release of **FORESIGHT** has significantly enhanced most functions of the system from both a user and data processing point of view.

**FORESIGHT** is based on an English language command structure using a businessman's terms. It is easy to learn and use, with no programming knowledge required. At the same time the extended features of **FORESIGHT** make it a powerful language, capable of a wide variety of applications. Self-documentation of all the model logic, relationships, and data may automatically be printed. This same feature makes model conversion from one computer system to another virtually automatic.

The same program can be used in a time-sharing, remote job entry, or batch environment, depending on the **MODE** command. **FORESIGHT** is available nationwide from the UCS (United Computing Systems) time-sharing network or can be purchased for in-house installation for all major computers. The new release makes possible the availability on a wide variety of mini-computers. It is also available overseas from a number of service bureaus. Single and double precision versions are available, as required. An active users group provides the impetus for a continual development program and for the exchange of ideas on **FORESIGHT** use.

<sup>1</sup> Purchase price includes installation and on-site training.

<sup>2</sup> Compatible for installation on eight major manufacturer's equipment and their operating systems.

<sup>3</sup> Marc Semanoff (For use on UCS Network)  
Eugene S. Oliver (For In-House Sales)

### Special Features

- **FINANCIAL ROUTINES:** Amortize, annuity, depreciation, present value, rate of return and spread.
- **CONSOLIDATION:** By entire models, reports, selected lines or columns. Models can be added (**ACQUIRE**) to one another or subtracted (**DIVEST**) from one another in whole or in part.
- **LOGICAL AND ARITHMETIC OPERATIONS:** Includes conditional IF, branching, **AND/OR ELSE**, **GO TO**, as well as the conventional arithmetic operations (+, -, x, /).
- **DATA BASE:** History files for retrieval, update and modification of models.
- **ACCESS PROTECTION:** Two-level protection to permit or restrict access to files.
- **DATAIN-DATAOUT:** Permits interaction with other files or programs. **EXIT** allows inclusion of user subroutines.
- **DATA ENTRY:** Automatically produces input forms and user prompts for model updating.
- **SENSITIVITY ANALYSIS-RISK ANALYSIS:** Through **FORESIGHT** techniques.
- **STATISTICAL FORECASTING:** Linear regression, projection, simple and double exponential smoothing, seasonality, learning curves. Single and multivariate regression. Linear and hyperbolic confidence bands.
- **OUTPUT REPORTING:** Automatic fixed report writer and flexible variable report writer as well as plotting.





**INTERACTIVE DATA BASE SYSTEMS**

Introduction to Interactive Data-Base Systems..... II.010

**ADP Network Services Inc.\***

IPL ..... II.020

**Amcort Computer Corporation**

AMBASE ..... II.040

IDM ..... II.041

**American Management Systems, Inc.**

MODEL 204 ..... II.060

SYSTEM 1022 ..... II.061

**Boeing Computer Services Company**

INQUIRE ..... II.080

SYSTEM 2000 ..... II.081

**Bowne Information Systems**

WORD/ONE ..... II.100

**CallData Systems, Inc.**

RAMIS II ..... II.120

SYSTEM 1022 ..... II.121

SYSTEM 2000 ..... II.122

**CompuServe Incorporated**

SYSTEM 1022 ..... II.140

**Computer Sciences Canada, Limited**

MANAGE ..... II.160

SYSTEM 2000 ..... II.161

**Computer Sharing Services, Inc.**

CSS-DMS ..... II.180

**Datalogics, Inc.**

EDMS/IDP ..... II.200

**Data Resources, Incorporated**

INSYTE ..... II.220

**General Electric Info. Serv. Co.**

DMS ..... II.240

**Infonet - Div. of Computer Sciences Corp.**

MANAGE ..... II.260

SYSTEM 2000® ..... II.261

**Informatics Inc. - Data Services Division**

ITIMS ..... II.280

MARK IV ..... II.281

MODEL 204 ..... II.282

RAMIS II ..... II.283

**Interactive Data Corporation**

XDMS ..... II.300

XSIM ..... II.301

**Interactive Market Systems, Inc.**

IMS ..... II.320

**I.P. Sharp Associates Limited**

MAGIC ..... II.340

**McDonnell Douglas Automation Company**

SYSTEM 2000 ..... II.360

**Mellonics Information Center**

IMS/VS ..... II.380

RAMIS II ..... II.381

TOTAL ..... II.382

**Mitrol, Inc.**

MIMS ..... II.400

**MRI Systems Corporation**

SYSTEM 2000® ..... II.420

**National CSS**

NOMAD ..... II.440

**On-Line Systems, Inc.**

OLIVER ..... II.460

**Rapidata, Inc.**

DBMS-10 ..... II.480

X2C ..... II.481

**Ross Systems, Inc.**

DATATRIEVE-11 ..... II.500

**Service Bureau Company, The**

MINI-MIS EXTENDED ..... II.520

**Standard & Poor's Fixed Income Systems**

FIMS ..... II.540

**System Automation Corporation**

REQUEST ..... II.560

**Tymshare, Inc.**

FOCUS ..... II.580

MAGNUM ..... II.581

**United Computing Systems, Inc.**

IFM ..... II.600

INFORM ..... II.601

SYSTEM 2000 ..... II.602

TOTAL ..... II.603

**University Computing Company**

DBIV ..... II.620

**Warner Computer Systems, Inc.**

WISE ..... II.640

\*Companies shown in **bold print** are Corporate Associate Members of ATSU.





**AN INTRODUCTION TO  
INTERACTIVE DATA BASE SYSTEMS****by Don C. Tarkenton**

As organizations become larger, more complex, and more diversified, their information needs often grow and change. Information, used in making decisions which affect the production of goods and services, must be timely and accurate to be of use. Interactive data base systems, developed over the past decade, provide the user with instantaneous access to and control over his data, thereby enabling him to make decisions based on up-to-the-minute information. Basically, data comes into the organization, is stored, processed, routed, analyzed, and otherwise interpreted into meaningful information. This information is then used in making decisions that help accomplish objectives. The large volume and complex nature of data, coupled with an ever-demanding, ever-changing environment, make it increasingly more difficult for an enterprise to control its information flow, to plan its future, to reach its goals. It is the interactive nature of automated data base systems which provide this needed control: what data comes in, how it is processed, and how it is disseminated and used throughout the organization. A special characteristic of interactive data base systems is that they provide the user with immediate access to information, in addition to offering the flexibility needed to quickly adjust to changing requirements.

**Commonly Used Data Base Terminology**

Data can be defined as any fact or collection of facts. The smallest component in a data base which can be stored, accessed, or manipulated is a field. On some systems, fields can be logically grouped into aggregates (group items in COBOL). For example, the fields STREET, CITY, STATE, and ZIP may form the aggregate ADDRESS. A record is a logical collection of fields and aggregates. A file is an application-oriented collection of records. In many instances files contain more than one record type. A data base may then be defined as a complete collection of records that may make up one or more files. The different files of a data base may share records and/or fields. Different techniques are employed to organize these files into a network where a record in one file can point (logically connect) to one or more records in any other file. This integration of data is needed to handle complex data structures. The concept of connecting the diverse portions of a data base serves to eliminate redundancy of data and to establish consistency of data across users. Importantly, any subset of the data base can be viewed and processed by different people for different purposes without affecting other users. As you might expect, different interactive systems provide for these needs to varying degrees. Some are simply file or record management systems, others are report generators, others query and retrieval systems. You must look at your information needs in order to determine which package will do the job; the analysis which follows is designed to give you a head start.

(continued...)

## Two Components of Data Base Systems

Data base systems can be divided into two logical components which may be of concern to users. First, the data definition (or description) language (often called DDL). It is through the DDL that the user defines a logical structure for his data: a description of the fields, the relationship of fields in a record, and the interaction of records. Second, the data manipulation language (often called DML) provides an interactive language by which all processing of data can be performed: creation, updating, deletion, query, and retrieval.

### I. The Data Definition Language (DDL)

DDL's can be distinguished according to their support of different types of fields, different logical and physical structures for storing data, and the ability to modify data base structure. Look for the following characteristics:

#### 1. Comprehensive Field Description

Numeric data can be represented in computers as signed integer, fixed point, floating point, packed decimal, or monetary. Some systems have a special field type for dates. Alphanumeric data can be fixed or variable in length, stored in table lookup or dictionary form, and handled as characters or strings. Repeating fields (and aggregates) are used to establish levels of hierarchy and to produce different record structures in the same file. Some systems utilize the data formats offered by their host language, such as PL/1 or COBOL. Variable length fields may or may not occur on any given record. The record itself then becomes variable, as in tree structured files. Regardless of the type of data, almost all data base systems employ some sort of compaction techniques (range offsetting, null suppression, or hashing) to reduce storage costs as compared to conventional systems. One obvious disadvantage here is that the user has to pay the cost (time and money) to compress and decompress his data. He usually gains, however, in retrieval time, since more data can be retrieved with each physical access.

#### 2. Ease in Modifying the Data Base

Systems vary in their ability to allow file modification. Many DDL's allow the user to add fields, to connect or link data files, and to change the characteristics of a field. In some cases dumping and reloading of the entire data base may be necessary to effect change.

#### 3. Logical Structure

It is the purpose of the DDL to describe all the necessary attributes of a file that are common to all records in the file. Data base systems employ a number of logical structural relationships in generating a data base. The simplest structure is sequential, which is fine for the IRS in processing income tax returns, but would never be used in law enforcement inquiry systems. Some systems employ an indexed sequential structure wherein a partial index table contains both data and pointers to records. Each index table entry is usually the last value in a physical block of data. The system must provide some method of adding records to this structure, either by reserving extra space in each physical block, or through an overflow technique. A full index scheme utilizes a field index of all data values which point to the remainder of the record. The records are randomly stored. The key must be unique for each record. Sufficient storage space must then be allotted to handle all possible keys. Alternatively, an algorithm might be used to compute the record address from a key, eliminating the need for an index table. This strictly random scheme makes it impossible to read the file sequentially and is not generally used in systems which report on large volumes of records. A chained list structure is one in which an index or key points to the first record in a list. Each record in the list (logically related since they all have the same key) has a forward pointer to the next record in the list. In some systems, each record also points backward to the prior record. Such a file structure can have any number of keys, thus establishing many different data relationships. An inverted list is one in which the key is

fully indexed (every record is in the index) and there is a pointer to the data. A fully inverted file is one in which every field is inverted, thus providing a quick retrieval mechanism for any user's need. However, the cost of reporting in such a system can be quite prohibitive. A variety of techniques may be employed to further link these logical structures into trees and networks. Among these are chains and lists, pointer arrays, symbolic keys, and linkages between files. Various levels of hierarchy in the data base can be established. Some systems provide no hierarchical ability, some have one level (record and subrecord), and others are virtually unlimited in their capability.

#### 4. Physical Structure

It is the concern of the DDL, not the user, to map the logical structure into the physical structure of the computer. Accordingly, major vendors have used some combination of both sequential and random access methods to establish the logical relationships. Among the techniques available on today's machines are indexed sequential, hashing, direct accessing, and other randomizing techniques. In summary, the DDL establishes both the logical and physical environment in which the data is handled. Control over file structure and file access and use is so important that most systems require a data base administrator (or DBA). He uses file activity, volatility of data, response requirements and knowledge of data structures in an attempt to define the data base, optimize its use, and to maintain security (access to data for reading or writing). Many systems provide everything an organization would ever want in a data base system, but the application fails because the organization does not train a data base administrator to control the data base (both structure and access) and to coordinate the activities of all the diverse users of the system.

## II. The Data Manipulation Language (DML)

Among the attempts to establish standards for data base systems is the committee work done by the Data Base Task Group, published in 1971 for CODASYL, the Conference of Data Systems Languages. CODASYL members include computer users, manufacturers, and government. The DML of CODASYL systems is COBOL. The users of these systems work within the framework of the host operating language (HOL) using its data structures and procedures. All manipulation of data is thus done under control of the HOL. Most non-CODASYL interactive data base systems, however, provide comprehensive stand-alone command and/or inquiry languages which facilitate direct user interface. Data base systems differ widely in their ability to perform the functions of data base management: data entry and deletion, editing or updating, search or query, retrieval and report generation, and data security and integrity. Points to consider include:

### 1. Advantages of HOL-Based Systems

Users of host-based systems often extol the fact that they can process their data through a language they already know, such as assembler, FORTRAN, COBOL, or PL/1. Data is readily passed to and from the HOL for processing. Any commands which exist in the data base systems which aid this process are typically simple and direct. Some systems use the DDL to produce a COBOL or PL/1 program which is then used as the DML.

### 2. Advantages of Self-Contained DML's

Stand-alone systems vary in the operators available, the ability to manipulate data, flexibility, and logical complexity. Most packages have English-like free-form DML's, but few approach providing a natural language capability. Few systems provide tutorial capabilities directly in the DML. Some stand-alone systems provide the ability to operate in a host environment (typically through subroutine linkage). Still others can execute procedures written in high level languages, thus adding the power of FORTRAN or PL/1, for example, to the DML's repertoire. To help accomplish data integration, some data base systems can either support or provide an interface to other packages such as graphics, statistics, financial modeling, and project scheduling.

### 3. Ease of Data Entry

Creation of records in most interactive data base systems includes extensive validity checking, either by the DML or by the user through a front end HOL. Validity checking includes range checks and data types (numeric, alpha, and so forth) as defined through the DDL. Some systems provide table lookup for fields whose valid values come from a user-specified dictionary of codes. Some systems allow the user to specify functional relationships between fields; for example, DATE.OF.SHIPMENT cannot occur before ORDER.DATE. Some packages require that all work be done by the user. New records can come from a variety of peripheral devices, including cards, magnetic tape, and disk. The format of data varies from a rigid structure (SSN must be in positions 1-9) to free format, and even to entering any field in any order. Most systems allow the user to do data entry in batch mode or in bulk for economy.

### 4. Ease in Manipulating the Data Base

Most interactive systems allow the user to update at the field level. Some limit the user to a single file while others permit processing across several interrelated data bases. Retrieval can be accomplished according to data content, record number, or by various keying techniques which depend on the file structure. Systems differ according to their ability to do certain operations or to make comparisons, and according to their level of complexity. Operators include a wide range of arithmetic (+, -, /, \*, exponentiation) and Boolean (AND, OR, NOT, XOR) operators, contextual searching (find a string of characters in a field), range testing (value between a and b), and soundex (sounds like) retrieval. Complexity in processing increases when multiple files are linked together, and when compound testing or nesting of phrases is allowed, as in, "IF (A AND B) OR C GT 5 THEN ... ELSE/ALSO ...". Often, complexity is limited only by core requirements or by features offered by the HOL. While most systems allow conversational updating of data, some provide for quite efficient batch processing of transactions. The subject of concurrent access is covered in the section on Data Integrity.

### 5. Flexibility in Report Generation

Data base systems may have a built-in report generator, link to another package, or depend on the capabilities of the HOL to produce reports. Some packages are quite interactive and flexible, providing the user with a variety of features to produce his own ad hoc reports. Other packages are relatively fixed, providing a standard set of reports or formats. Data base systems which support complex data structures usually support some level of multifile reporting and multiple reports in a single pass of the retrieved list of records. A multitude of capabilities exist among today's report generators. These include sorting; logical and arithmetic testing; producing statistics such as minimum/maximum, average, standard deviation, and totals; output to a variety of devices; and output in many forms, including detail/summary, tailored/customized, graphics, and tables. Providing management with any and all levels of information can be accomplished in systems that handle titles and headings, conditional paging, multiple levels of summarization with control breaks, and summarization at end-of-page and end-of-report.

### 6. Data Base Security

It is usually the responsibility of the data base administrator within the firm to determine the security needs of his data base users. Many systems depend on the user to control access to the data through the host language or through login security procedures. Most provide varying levels of read/write access at the field, record, and file levels. Data encryption is sometimes employed for additional security. Various means of surveillance can be employed by the DBA, such as logging transactions and gathering access and usage statistics. Access to the DDL commands for modifying structure or security passwords is restricted to the DBA.

## 7. Integrity

Important integrity features are built into many data base systems to protect against loss of data, to correct erroneous updates (mistakes in logic on the user's part), and to handle concurrent interaction between simultaneous users of the data base. With small data bases it may be feasible to provide backup by dumping the entire file or by keeping duplicate copies of data. Larger systems often handle this by periodically dumping the file and also keeping an audit trail of all updates to the data base. The audit trail can then be applied to the latest dump of the file to correct user mistakes or recover from hardware failure. Other methods include checkpoint/restart and user-controlled backup. Concurrent access to the data base is common in timesharing systems. The usual method of implementation is lockout at either the record or file level. This means that any number of users can access the data base simultaneously, but only one user at a time can write a given physical block in the data base. Multiple requests are queued by the data base system. Most systems are written in reentrant code for effective use by many users. Data integrity is also maintained to some degree by the validity checks provided through the DDL and by extensive English-like diagnostics. Diagnostics are printed interactively at the user's terminal, returned as an error code to the HOL, or logged to an error file during processing.

## Conclusion

The timesharing industry provides a broad range of data base systems to handle an enterprise's data management needs. These systems range from basic information storage and retrieval systems to complex data base management systems for handling the integrated data base needs of large corporations. The user should be able to pick and choose among the available packages to fit his application, keeping in mind that he should first make a complete analysis of his information requirements. It is expected that data base management systems will continue to evolve and to play a valuable role in the daily operation, planning, and decision making processes of today's enterprises.









Company Name : **AMCOR COMPUTER CORPORATION**  
Headquarters Address : **1900 Plantside Drive, Louisville, KY 40299**

Product Name : **IDM**  
Number of years commercially available : **Five (5)**  
Date of last up-date or improvement : **Spring 1978**  
Approximate number of current users : **70**  
Purchase price if available on in-house equipment : **\$9,500**  
Type(s) of equipment compatible for in-house use : **Digital Equipment Corporation PDP 11 series under RSTS/E**  
Headquarters contact : **Robert G. Bearden** Telephone No.: **(502) 491-9820**

## General Description

**IDM - A generalized data base management system which has been operational for over five years. The system (IDM) is designed to operate in an on-line environment utilizing the RSTS/E operating system on any member of the PDP/11 family of computers, capable of supporting RSTS/E. The modular design and use of standard files, programs and startup techniques allow for rapid design and initialization of systems, saving your systems personnel considerable time in developing custom systems.**

**User training is available if required.**

- All programs in IDM are written in the BASIC-PLUS language and are designed for ease of operation and maintenance.
- File sizes and volumes dependent on the types of disk drives being utilized.
- Complete documentation
- Continually maintained and updated
- Available on 800 BPI, 9-track magnetic tape or RPO3 disk pack
- Modular design
- Standard file layouts - allow utilization of a basic set of pre-written programs
- Standard system utilization programs
- Standard system utilities
- Search, Add, Delete routines (all standard)
- Function controlled, keyword driven parameters for ease of use.

## Special Features

- Self maintaining
- Dynamic maintenance of up to three sorts-optionally handles 32,000 logical data records per data file-up to 23 data files supported-thus enabling relatively flexible data bases
- Immediate access to all stored data available to user for inquiry, reporting, etc., once a transaction is entered into the data base
- Automatic packing of logical records into physical records provides for minimum storage utilization
- Standard modules exist for: Entry Programs - Maintenance Programs - Display Programs (reports) Systems personnel have the option to use these programs as they are or custom code routines to interface to these programs
- Runs under the RSTS/E operating system, on any member of the PDP/11 series of computers, with up to 10K words required when using all subroutines, out of 16KW user area available
- Report generator designed for nontechnical personnel
- Generalized data entry/maintenance module (which supplies estimated 90% or more user requirements)



Company Name : AMERICAN MANAGEMENT SYSTEMS, INC.

Headquarters Address : 1515 Wilson Boulevard, Arlington, VA 22209

Product Name : MODEL 204

Number of years commercially available : Eleven (11)

Date of last up-date or improvement : June 1, 1978

Approximate number of current users : 2000

Purchase price if available on in-house equipment : \$80 - 120,000

Type(s) of equipment compatible for in-house use : IBM 370/165, 3033

Headquarters contact : Ray Kane

Telephone No.: (703) 841-6406

## General Description

Model 204 is a proven data base management system offering multi-key access with rapid response for small to very large data bases. It incorporates flexibility in data organization and safeguards for privacy and data integrity. It uses an inverted file access method that responds to user-specified search criteria without requiring access to the data itself. Included in the User Language are facilities for information retrieval, file maintenance, computation, report generation, sorting, cross-referencing and program control.

## Special Features

- Rapid retrieval for on-line queries gets the data when it's needed.
- For purposes of cross-referencing, any number of Model 204 data bases can be accessed by any on-line or batch Model 204 job without modification (true multi-threading).
- Data relationships are defined dynamically as needed, freeing the user from the rigid structures imposed by earlier data base systems.
- The ability to change number of fields and field size without requiring reorganization or reprogramming allows open-ended application growth.
- Simultaneous on-line and batch access to the same data is permitted.
- Model 204 can be used directly by COBOL, PL/1, FORTRAN and BAL programs.
- Efficient management of large and small data bases facilitates growth without performance degradation.
- Data bases can be accessed or updated from any number of remote terminals.
- Stored data can be retrieved on the basis of multiple retrieval keys.



Company Name : AMERICAN MANAGEMENT SYSTEMS, INC.

Headquarters Address : 1515 Wilson Boulevard, Arlington, VA 22209

Product Name : SYSTEM 1022

Number of years commercially available : Six (6)

Date of last up-date or improvement : January 1, 1979

Approximate number of current users : 1500

Purchase price if available on in-house equipment : \$38,900

Type(s) of equipment compatible for in-house use : DECSYSTEM-20

Headquarters contact : Jack Thomas

Telephone No.: (703) 841-6274

## General Description

System 1022 is a generalized data base management system. Using an inverted list structure, 1022 provides quick retrieval of information. This inverted list structure allows users to simulate hierarchical, network and relational data base structures.

## Special Features

- Report generator for simple or complex reports
- Host language interface to COBOL, FORTRAN or MACRO
- Audit trails
- Security through passwords down to the field level
- Complex structuring of Boolean and logical operators for retrievals
- Reporting on external data files
- Automatic sub-totalling and grand total for reports
- English-like commands



Company Name : **BOEING COMPUTER SERVICES COMPANY**

Headquarters Address : **177 Madison Avenue, Morristown, NJ 07960**

Product Name : **INQUIRE (Infodata Systems, Inc.)**

Number of years commercially available : **Five (5) at BCS**

Date of last up-date or improvement : **1977**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Customer Support, McLean, Virginia**

Telephone No.: **(703) 821-6050**

### General Description

INQUIRE is a fully integrated data base management system that responds quickly and effectively to the user's need for maintaining and interpreting information. Storing and fetching data are performed automatically at the user's request. The user is free to create logical storage structures dynamically. Search strategies are unlimited, and new applications are independent of the storage structures of previous applications. Interpretive reporting facilities are built in and provide immediate availability of information — as soon as data is entered — without writing computer programs.

INQUIRE performs data base management and information retrieval functions in batch or teleprocessing environments, and extends the power of both facilities by the dynamic structuring of logical data storage. INQUIRE enables the user to interact with its facilities by way of an English-like language that has a built-in capacity to grow.

### Special Features

- Data Base Definition and Structure
  - Multiple Data Base Hierarchies
  - Multiple Data Base Networks
  - Relational Data Bases
- Data Base Loading
  - via Utilities
  - via Host Programs
- Data Base Access
  - Direct by Multiple Keys
  - Sequentially
  - Field Requests by Host Programs
- Data Base Integrity
  - Record and Data Base Protection
  - Backup and Recovery Procedures
- Data Base Security
- Data Base Accounting
- Transaction Teleprocessing
- Batch Processing

Company Name : **BOEING COMPUTER SERVICES COMPANY**

Headquarters Address : **177 Madison Avenue, Morristown, NJ 07960**

Product Name : **SYSTEM 2000 (MRI Systems Corporation)**

Number of years commercially available : **Three (3) at BCS**

Date of last up-date or improvement : **1977**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Customer Support, McLean, Virginia**

Telephone No.: **(703) 821-6050**

## General Description

**SYSTEM 2000** is a complete third generation data base management system providing the capability to describe information structures in terms relating directly to the user application with total transparency of underlying file and record structure. Any number of key information elements may be designated for access purposes. Access to data base elements may be made from an interactive terminal via the Natural Language (query language) or by the Procedural Language Interface (PLI) from FORTRAN or COBOL programs. Access to data base elements may be made for the purposes of updating and reporting with security provided down to the element level. The Report Writer feature provides a capability for more detailed formatting than that of the Natural Language. A full audit trail capability provides a flexible means of restructuring damaged data bases.

## Special Features

- Data Base Design and Definition
  - Data Structure Analysis
  - Data Base Size and Storage Allocation Analysis
  - Data Base Performance Analysis
  - Data Base and Application Prototyping
- Data Base Creation
  - Self Contained Language Feature
  - Procedural Language Interface
- Data Manipulation
  - Procedural Language Interface
  - Self Contained Query/Maintenance Language
  - Report Writer
- Data Base Administration
  - Activity Audit
  - Item Level Security
  - Error Detection
  - Update Log
  - Save/Restore Features
  - Restructuring
  - Statistical Analysis
  - User Accounting

Date: **May, 1979**

Submitted By: **James H. Milton, Finance Industry Manager**



Company Name : BOWNE INFORMATION SYSTEMS

Headquarters Address : 160 Water Street, New York, NY 10038

Product Name : WORD/ONE

Number of years commercially available : Ten (10)

Date of last up-date or improvement : on-going

Approximate number of current users : 4000 (thru 600 customer sites)

Purchase price if available on in-house equipment : 1

Type(s) of equipment compatible for in-house use : 2

Headquarters contact : Bernard Halligan

Telephone No.: (212) 952-4400

## General Description

Word/One is an interactive telecommunications system encompassing special capabilities in text management and information storage and retrieval. The system enables the user to enter, format and display free form textual information and to utilize powerful editing and text reorganization and information retrieval capabilities. Word/One stores information for immediate on-line access. The system provides communications between any, or all, of the Word/One terminal operators. In addition to supporting low and medium speed terminals (Lanier, Vydec, CPT, Jacquard, IBM CMC/ST, Redactron, AJ, Lexitron, IBM 2741) Word/One supports the use of high speed upper and lower case printing (1403s) and Xerox 9700 laser imaging and printing systems.

A user access Word/One by making the "Bowne Connection" from a word processor or communicating typewriter/terminal in his office. This links the terminal or word processor via a nationwide data network directly to the Word/One software.

Optionally Bowne can provide users with access and use of any of the Word/One capabilities thru its Cyberway Division which provides trained people and equipment resources to implement Word/One for a customer. On a project basis.

And a user may elect to install Word/One on his own IBM system. Word/One runs directly under the following IBM S/360/370 operating systems MVS, SVS, VSI, OS/MVT & MFT and DOS. Bowne provides installation support and is totally responsible for maintenance and enhancements. Complete user documentation is provided.

<sup>1</sup> \$65K and above depending on software configuration and level of personnel support required.

<sup>2</sup> Operates on IBM 360/370. Compatible with most word processing and terminal devices: (IBM Mag Card, Vydec, Lanier, Lexitron, 2741 etc...

## Special Features

Word/One contains special features to simplify the entry, modification, storage and retrieval of text.

As an interactive data base service available through the Bowne network, Word/One provides virtually unlimited storage to text; access to special proprietary data bases; access to KeySearch information and records management system; interface with PhotoComp a photocomposition software package; Mailpac and electronic information exchange facility for transmitting data from point to point; for maintaining name/address list; for producing volumes of personalized correspondence and for tracking response and letter activity.





Company Name : **CALLDATA SYSTEMS, INC., Subsidiary of Grumman Data Systems Corp.**

Headquarters Address : **20 Crossways Park North, Woodbury, NY 11797**

Product Name : **RAMIS II**

Number of years commercially available : **9**

Date of last up-date or improvement : **August, 1978**

Approximate number of current users : **1,000 plus**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Reggie Jenkins**

Telephone No.: **(516) 575-8403**

### **General Description**

**RAMIS II is an integrated family of five basic systems:**

- **Data Base Management System**
- **Records Management System**
- **Report Preparation System**
- **Programming Interface System**
- **Run Executive System**

**RAMIS II uses hierarchical structured files within a data base which can be networked if required to avoid redundancy. Files can be processed separately for easy data maintenance. RAMIS II permits access to multiple databases.**

**When reporting, users simply specify what information is wanted. RAMIS II retrieves the required data, analyzes and sorts it, and displays it. Thus, ad hoc reporting is simple and fast.**

**RAMIS II allows for multiple data input formats, sophisticated editing and logging capabilities and even "dry run" updating for screening input. RAMIS II can define and utilize fields which are not a part of the database. RAMIS II accepts data in all formats (binary floating point, etc.). RAMIS II can create a permanent file from data retrieved for a report, or remassage the same data for further reporting and/or graphing. RAMIS II functions can be batched and run or executed interactively in a conversational mode. Frequent functions can be catalogued for future use.**

**RAMIS II is a product of Mathematica Products Group, Inc.**

### **Special Features**

- **Simple English instructions quickly transforms questions and information requirements into results**
- **Powerful and sophisticated system to handle the most complex data processing requirements**
- **Ability to report from files external to the RAMIS II database**
- **Option of using own code routines at any point in the maintenance or reporting stage (Fortran, Cobol, Assembler, PL/1)**
- **Interactive editor to easily add, change or delete records to any file**
- **Security at all levels, file, logical record, or individual field**
- **Graphing capabilities for trend analysis and pictorial comparisons of data (budget as comparative results, etc.)**



Company Name : CALldata SYSTEMS, INC., Subsidiary of Grumman Data Systems Corp.

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : SYSTEM 1022

Number of years commercially available : 5

Date of last up-date or improvement : January, 1977

Approximate number of current users : 10

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : DEC-10's and DEC-20's

Headquarters contact : Reggie Jenkins

Telephone No.: (516) 575-8403

## General Description

SYSTEM 1022 is a sophisticated general purpose data management system for any application that involves creation, update, and retrieval of information from a data base. It was designed to be used in both large and small data base situations and features an efficient and fast retrieval capability and a comprehensive report writer. In addition, SYSTEM 1022 can be used either as a stand alone system or embedded within a FORTRAN IV, FORTRAN 10, BASCOM, BASIC or COBOL program for maximum flexibility.

Applications for the use of SYSTEM 1022 are numerous in business, government and educational fields in such diverse areas as:

- Inventory control
- Personnel files
- Financial histories
- Quality control data
- Sales records
- Marketing analysis

System 1022 is a product of Software House, Inc.

## Special Features

- English-like commands for all operations within the system
- Conversational timesharing or batch mode of operation for cost savings
- Immediate access to records based on user-defined keys
- Any number of fields may be used as keys
- Command files available for performing multiple repeated operations
- Fields may be integer, real, date, or text formats. Fields are compressed internally to as little room as necessary to represent the data.
- A few simple commands can easily generate reports as described by the user and can easily be changed
- Resources are allocated dynamically as they are needed, so that only those resources that are actually needed will be used. The user may exercise some control over these resources to increase efficiency.

Company Name : **CALLDATA SYSTEMS, INC.**

Headquarters Address : **20 Crossways Park N., Woodbury, NY 11797**

Product Name : **SYSTEM 2000**

Number of years commercially available : **10**

Date of last up-date or improvement : **May, 1978**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Reggie Jenkins**

Telephone No.: **(516) 575-8403**

## General Description

System 2000 is a general purpose data base management system providing the user with a comprehensive set of capabilities. These include the ability to define new data bases, modify the definition of existing data bases, and to retrieve and update values in these data bases.

The primary components of data base definitions are data elements and repeating groups. Repeating groups describe a structure for storing multiple sets of data values and also serve to link heirarchical levels of the definition.

With System 2000 values for each data element and logical entry (record) can vary in length. The user can specify, without restriction, which elements in the data base are to be inverted and become key fields, as well as what heirarchical relationship an element will have with other elements in the data base.

For data security, System 2000 provides archival copies of data bases and records an audit trail of changes made. Data bases can be easily reconstructed from these two parts. Access security is provided at the component level by five levels of security: administration, access, update retrieve and select.

System 2000 is a trademark of MRI Systems Corporation.

## Special Features

- Query/Update provides a user-oriented language for retrieval and update by non-programmers.
- Report Writer enables the user to prepare up to 100 reports on a single pass through the data base. Permits column, row and page headings, dates, footnote captions and synonym tables for data expansion. Also multiple formats, automatic totals and breaks on sorted fields.
- Sequential File enables the processing of a major part of the data base from magnetic tape. Useful for massive data bases.
- Host Language Interface provides full access to the data base for updating and reporting with FORTRAN, COBOL, ASSEMBLER, AND PL/1. Status flags are provided to permit easy checking of conditions.



Company Name : **COMPUSERVE INCORPORATED**

Headquarters Address : **5000 Arlington Centre Blvd., Columbus, OH 43220**

Product Name : **SYSTEM 1022**

Number of years commercially available : **Four (4)**

Date of last up-date or improvement : **January, 1976**

Approximate number of current users : **Over 100**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **1022 Product Manager** Telephone No.: **(614) 457-8600**

### **General Description**

**SYSTEM 1022** is a sophisticated, general purpose data management software system featuring extremely fast retrieval, flexible report generation, and free format English-like commands. **SYSTEM 1022** provides a convenient means for maintaining vast amounts of information utilizing standard defaults for commands thus reducing the amount of information required to be entered by the user. Multiple users can perform simultaneous immediate access to records based on user-defined keys eliminating the need for sequential searches of the entire data base on most occasions.

The sophisticated report generator provided by **SYSTEM 1022** can easily produce custom designed reports by simply specifying a few elementary commands. The report generator also provides user options for efficient sorting, automatic pagination, titling and formatting as well as arithmetic functions for row and column totaling.

**SYSTEM 1022** can be used for simple data retrieval, maintenance and reporting, or it can be used to implement complex management information systems utilizing its self contained Data Programming Language and Host Languages interface with the COBOL and FORTRAN programming languages. Application areas in which 1022 is currently being used include: correspondence control; market research; advertising space sales; stock option analysis; inventory control; membership accounting; accounts payable and receivable; personnel management; hospital client information; property tax accounting; court dockets; hotel management; loan reporting; and many more.

### **Special Features**

- Indexed access for fast retrieval
- File and item level data security features
- Efficient sorting and flexible report generation
- Host language interfaces with both COBOL and FORTRAN
- Supplementary programs:
  - ECL** - an Extended Command Language for 1022 providing: default report generation with a single command, cross referencing between multiple data bases, facilities for merging data bases, record selection based on values that sound alike, and a verify option when updating data bases.
  - FORMUP** - a Formatted Updating program for 1022 that provides the ability to make use of all of the features of both **SYSTEM 1022** and **ECL** plus the ability to use a formatted CRT display for data entry.
  - UP1022** - a batch updating program for transaction processing.



Company Name : COMPUTER SCIENCES CANADA, LIMITED

Headquarters Address : Suite 367, Place du Canada, Montreal, Quebec

Product Name : **MANAGE**

Number of years commercially available : **Four (4)**

Date of last up-date or improvement : **January 26, 1979**

Approximate number of current users : **400 plus**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **David McIntosh**

Telephone No.: **(416) 363-8401**

## General Description

**MANAGE** is a comprehensive system used to design, maintain, and query data bases of virtually any data architecture. The data definition language, DDL, follows codasyl guidelines to define and interrelate record types into any logical data structure. Independent logical file models permit the definition of relational files, hierarchical and network structures.

The DDL schema allows for defining and naming of record types, the elements of each, keys, and set relationships between record subsets, restricting data access, and specifying data access structures between sets.

Record types and related components are stored in independent files for independent record-type by record-type loading, updating, and restructuring. Keys used to interrelate record types into sets are automatically maintained. Users need not be concerned about intermediate data storage, sort orders, or physical file layout since the access strategy is automatically optimized for each inquiry.

Inquiry, reporting, changing element values, deletions, and additions of records, and data base maintenance are provided for through: the query language for ad hoc access and the non-technical user, the procedure oriented language for the technical user, and the program language interface for the application programmer. The **MANAGE** queries are user oriented single statements capable of spanning multiple record types within a data base.

System control is enhanced by audit trails, automated error recovery procedure, and data base reorganization facilities. Security can be controlled at the system and data base level for records or elements. Data base administration aids include a graphical display of network structures and commands to modify definitions and structures and to recover data bases.

## Special Features

- Codasyl - like DDL to define schema, subschemas, and structures.
- Relational, hierarchical, and network structures.
- Up to 63 record types; data bases up to 4 billion characters.
- Repeating groups, variable length multi-valued fields.
- File, page, record, and field level security control including read and write control.
- Query language which automatically optimizes access strategy.
- Procedure oriented language for production processing.
- Inter product linking for financial modeling and graphics.
- Data, arithmetic, and character field types.
- Multiple key fields and index type options.
- User controlled rollback of transaction processing.
- Audit trails (before and after updates.)
- Multi-user concurrent access control at the file, page, or record level.



Company Name : COMPUTER SCIENCES CANADA, LIMITED

Headquarters Address : Suite 367, Place du Canada, Montreal, Quebec

Product Name : SYSTEM 2000

Number of years commercially available : Four (4)

Date of last up-date or improvement : Continuous

Approximate number of current users : Over 25

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : David McIntosh

Telephone No.: (416) 363-8401

### General Description

SYSTEM 2000 is a general purpose DBMS. Basic SYSTEM 2000 provides the capability to define new data bases, modify the definition of existing data bases, retrieve and update values in these data bases, provide archival copies of data bases and record and audit trail of changes for checkpoint/restart. Data security is maintained by password control to each component. The Procedural Language feature allows the user to manipulate the data base from FORTRAN and COBOL. Inter-relationships between two or more data bases can be established which permit network data structure to be defined. The Immediate Access feature provides a user oriented language with which a non-programmer may express his requests for retrieval or updating of a data base. The Report Writer feature enables the user to prepare report definitions in which he can generate breakpoints on any data base element, specify page headings and footnotes, control item inclusion, and control the accumulation of subtotals or grand totals dynamically via control statements. Up to 100 reports can be generated from a single pass of the data base files.

SYSTEM 2000 (licenced by MRI) takes on an added dimension as it is implemented on CSTS (Computer Sciences Teleprocessing System). Data base updates and retrievals can be accomplished from any point in Computer Sciences Data Communications Network. SYSTEM 2000 program development is very convenient due to PCF (program checkout facilities) in FORTRAN and COBOL, SYSTEM 2000 can also be used with other CSC product offerings such as TSP, FLARES, DISSPLA, etc.

### Special Features

- Hierarchical structure
- Multiple keys
- Queue Access
- Report Writer
- Procedural Language interface
- CSC - provided documentation & training



Company Name : **COMPUTER SHARING SERVICES, INC.**

Headquarters Address : **2498 West Second Ave., Denver, CO 80223**

Product Name : **CSS-DMS**

Number of years commercially available : **6 months**

Date of last up-date or improvement : **January, 1979**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Dan Walkovitz**

Telephone No.: **(303) 934-2381**

## General Description

**CSS-DMS makes it easy for time-sharing users to create and maintain large quantities of information in a logical form which allows quick, easy retrieval.**

**You may specify exactly the information you wish to retrieve. Then CSS-DMS can produce a finished, formatted report. Its powerful sorting capabilities make it easy to display the information in any order you choose. Report headings may be generated automatically from the information in the database.**

**CSS-DMS offers tremendous flexibility in the design of your database. The detailed structure you choose depends on the primary purposes of the database and what its most common uses will be.**

**CSS-DMS is a hierarchical-sequential database manager. That means your data is arranged according to its own internal structure. Chains of data items have parent-dependent relationships with one another.**

- **CSS-DMS makes it easy to retrieve any item of data with a one-line command. Data belonging to any special category may be selected and retrieved just as easily.**
- **Once you have decided upon the information you want to display, the versatile report writer takes over to create attractive reports formatted to your specifications.**
- **CSS-DMS has powerful sorting capabilities which arrange your data in any order you specify.**
- **English language commands perform all CSS-DMS operations for you, whether simple or complex.**

## Special Features

- **CSS-DMS accommodates complex, widely variable database structures which are extremely difficult to implement using conventional programming techniques.**
- **Your CSS-DMS database may be integrated into any of your other programs.**
- **Large blocks of data are dynamically allocated whenever the database is created or reorganized by CSS-DMS. There is no wasted storage space!**
- **You may specify up to 100 record types and ten levels of parent-dependent relationships with CSS-DMS.**



Company Name : DATALOGICS, INC.

Headquarters Address : University Circle Research Center, 11001 Cedar Ave., Cleveland, OH 44106

Product Name : EDMS/IDP (Extended Data Management System/interactive Database Processor)

Number of years commercially available : 8

Date of last up-date or improvement : Continuous

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Mr. Thomas J. Madden Telephone No.: (216) 229-1300

## General Description

The Extended Data Management System (EDMS) serves as an interface between a user and his data. The user defines his database and generates applications programs that communicate with EDMS in terms of the defined data characteristics and relationships. EDMS, in turn, communicates with the host operating system in terms of files, granules, etc., to transfer the specified data values to and from the database in response to user program requests.

The concept of a database is central to the design of EDMS. An EDMS database is an organized, interrelated collection of information required for various types of activities (e.g., a company's accounting, inventory, and personnel records). Its purpose is to make the same information available for many different uses without incurring the overhead of redundant storage. The value of an EDMS database is realized when there is a need to access the same data values in several different ways, for several different purposes. For example, purchase order data may be used by both accounts payable and inventory control. Accounts payable may need all data for all purchase orders to each vendor. Inventory control may need the total number of parts ordered from all vendors for each type of part ordered. To reduce the number of times the counts of parts ordered must be stored or to reduce the number of times a file must be sorted to produce the information in the desired order, purchase-order data may be stored in an EDMS database and simply linked in the desired ways. Similarly, information on, for example, students assigned to a particular class may be linked in several different ways for use in generating class rosters and in generating student grade reports.

The EDMS capability for accommodating multiple relationships among data values in a database is the most important aspect of the system. Data relationship processors are provided along with the system features for managing the database, physical structuring of the database files, and facilities for database restructuring.

## Special Features

Interactive Database Processor (IDP) query language is a processor which is provided for users of Extended Data Management System (EDMS) and offers the capability for on-line retrieval and display of data maintained within EDMS databases. It can be used for a multitude of applications and by people of varying degrees of proficiency. An IDP user need not have any knowledge of programming or of EDMS. All a user needs to know are the names of the items contained in the database.

The IDP query language consists of keywords and operators that can be combined with database item-names and literals to form meaningful query statements. Of the fifteen basic commands in the IDP language, only two, QUERY and DISPLAY, are necessary to produce a basic report. The other commands are optional and provide additional capabilities, such as for sorting a report or for accumulating counts and totals.



Company Name : DATA RESOURCES, INCORPORATED  
Headquarters Address : 29 Hartwell Avenue, Lexington, MA 02173

Product Name : INSYTE  
Number of years commercially available : Eight (8)  
Date of last up-date or improvement : ongoing  
Approximate number of current users : 25  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Sanford R. Friedman  
Telephone No.: (617) 861-0165

## General Description

INSYTE® is a multi-purpose data management system that provides reliable, easy, and efficient storage and retrieval of information. A one-time compilation of the user's specifications tailors the data structure for efficient use. Interactive retrieval, analysis, and updating can then be performed by typing simple English sentences. The command language is oriented to the non-programmer, using terminology familiar to the user's application.

Record selection may be by alphanumeric string match, by numeric value range, by date, or by relationship between variables. Mathematical formulas, with any combination of data fields, may be used in selection, sorting, and reports. Complex selection criteria may be specified as rules, or may evolve through result analysis and revision.

INSYTE (DRI) has three configurations. 1) In the standard form, it provides retrieval, updating, and report generation from a single INSYTE storage and retrieval system. 2) Multiple related INSYTE file systems may be associated with a master file that can access all the sub-systems concurrently. 3) An interpretive report writer is available for flexible use in small information systems.

INSYTE support is enhanced by operating conveniences such as storage of frequently used specifications, editing of prior commands, and inquiry about the environment status.

INSYTE® is a registered trademark of Response Technology, Inc.

## Special Features

Report Generation - formatted and sorted, in either column, matrix, or paragraph form; with control breaks and subtotal. Specifications may be retained for later use.

Cross-tabulations - with counts, percentages, totals, averages, maximums, minimums.

Statistical Inquiries - on counts, percentages, proportions, totals and averages.

Updating - Interactively add, revise, or delete records individually or collectively, with recovery from machine failures; batch update from any fixed format card, tape, or disk files, with flexible restart facilities.

Security - for any desired data names using required password entry at the field level.



Company Name : GENERAL ELECTRIC INFORMATION SERVICES COMPANY

Headquarters Address : 401 N. Washington St., Rockville, MD 20850

Product Name : DMS

Number of years commercially available : Five (5)

Date of last up-date or improvement : February, 1979

Approximate number of current users : 2500

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : W. L. Backer

Telephone No.: (301) 340-4698

## General Description

DMS Level 3 is a general purpose data base management system that provides a powerful tool for implementing and maintaining data base applications. This is accomplished by DMS in conjunction with HISAM (the data base manager incorporated within the DMS system), by organizing the various data elements into a hierarchical structure, and retaining relationships between the different data elements within the structure. Through the use of the DMS language, the data elements can be manipulated for functions such as retrieving and updating.

## Special Features

- Tabular Reporting
- Graphic Output Capability
- Interface with other GEISCO Systems
- Table Look-up Facility
- Multi-Lingual Capability
- Multiple Reports with Single Pass
- Procedural Language Interface
- English-like Language



Company Name : **INFONET Division of Computer Sciences Corporation (CSC)**

Headquarters Address : **650 N. Sepulveda Blvd., El Segundo, CA 90245**

Product Name : **MANAGE**

Number of years commercially available : **n.a.**

Date of last up-date or improvement : **January 26, 1979**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **C. Michael Dishman**

Telephone No.: **(213) 678-0311**

(213) 642-0063

### General Description

**MANAGE** is a comprehensive system used to design, maintain, and query data bases of virtually any data architecture. The Data Definition Language (DDL) follows CODASYL guidelines to define and interrelate record types into logical data structures. Independent logical file technology permits the definition of relational-like, hierarchical, and network structures.

The Schema DDL provides for the definition and naming of record types, their elements, validation criteria, keys, and set relationships between record types. The subschema DDL allows for the definition and naming of logical subsets, restriction of data access (security), and specification of structures (combinations of sets).

Record occurrences are stored in independent files by type. Keys used to interrelate record types into sets are automatically maintained. Users need not be concerned about sort orders or physical file layouts since the access strategy is automatically optimized for each inquiry.

Inquiry, reporting, changing element values, deletions and additions of records, and data base maintenance are provided for through: A Query Language for ad hoc access and the non-technical user, a Procedural Language for the technical user, and a Program Language Interface for the application programmer. User queries are simple statements capable of spanning multiple record types within a data base.

System integrity is maintained by audit trails, automated error recovery procedures, and data base reorganization facilities to delete or add new records, elements, sets and structures, change the definitions, or rename the components. Security and privacy can be controlled at the system level and data base level including subschema, record, and element levels. Shared access by multiple users, making simultaneous changes, is automatically provided.

Data Base Administration aids include a Data Dictionary Display System (including graphical display of network structures) and Commands to modify definitions, implement security, reorganize structures, and recover data bases.

### Special Features

- Up to 63 record types
- Variable length multi-valued fields
- File, record, and field level security control
- Query language for non-technical users
- Procedural language for production processing
- Host Language Interface
- Multi-user concurrent access control
- Inter-product linking for financial modeling and graphics



Company Name : INFONET Division of Computer Sciences Corporation (CSC)

Headquarters Address : 650 N. Sepulveda Blvd., El Segundo, CA 90245

Product Name : SYSTEM 2000®

Number of years commercially available : n.a.

Date of last up-date or improvement : Continuous

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : C. Michael Dishman

Telephone No.: (213) 678-0311

## General Description

SYSTEM® 2000 is a general purpose DBMS with the capability to define new data bases, modify the definition of existing data bases, retrieve and update values in these data bases, provide archival copies of data bases, and record and audit trail of changes for checkpoint/restart. Data security is maintained by password control to each component. A Procedural Language feature allows the user to manipulate the data base from FORTRAN and COBOL. An immediate Access feature provides an interactive way to request retrieval or updating of a data base. A Report Writer enables the user to prepare up to 100 reports from a single pass of the data base files.

SYSTEM® 2000 (licensed by MRI) on Computer Sciences Teleprocessing System enables data base updates and retrievals to be accomplished from any point in Computer Sciences worldwide Data Communications Network.

## Special Features

- Hierarchical structures
- Multiple keys
- Immediate Access
- Report Writer
- Procedural Language Interface





Company Name : INFORMATICS INC. — DATA SERVICES DIVISION

Headquarters Address : 6 Kingsbridge Road, Fairfield, NJ 07006

Product Name : ITIMS (INFORMATICS TIMESHARED IMS)

Number of years commercially available : 3

Date of last up-date or improvement : January, 1978

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : David Aach

Telephone No.: (201) 575-2800

## General Description

ITIMS provides a total environment for the Interactive development of IMS DB/DC applications. It includes a full set of interactive tools for IMS data base design, application program creation, debugging, and installation, providing it's users a wide range of services at all points in their development cycle.

A complete IMS system, enhanced to provide greater terminal usability has been Installed under VM/CMS. Some of the major features are:

- On-line DBD and PSB generation
- DLIBATCH, controlled execution of IMS/DB applications from an interactive terminal
- IMSDEBUG, Informatics unique interactive symbolic debugging package, tailored to the needs of the IMS user
- Interactive reorganization and logical relationship resolution utilities
- Interactive productivity aids such as DBPROTOTYPE, IMSMAP, TIMS, BTS, and the Screen Image Preprocessor

The wide range of services provided are demonstrated through the variety of usage by iTIMS users: application program development, system software development, data base design, system testing, and IMS training.

## Special Features

- Compressed IMS training cycle
- Testing with or without a data base
- Simplified DL/I diagnostics
- The ability to modify PCB fields to suit testing needs
- Full Interactive debugging
- No post-mortem analysis
- Shorter development times
- Improved productivity

Company Name : **INFORMATICS INC. — DATA SERVICES DIVISION**

Headquarters Address : **6 Kingsbridge Road, Fairfield, NJ 07006**

Product Name : **MARK IV**

Number of years commercially available : **15**

Date of last up-date or improvement : **April, 1978**

Approximate number of current users : **1300**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Jlm Zimmermann**

Telephone No.: **(201) 575-2800**

## General Description

**MARK IV is a general purpose data management system that provides the analyst a tool for efficient day-to-day operation of a variety of general file maintenance, data base handling and management information applications.**

**A basic tenet of MARK IV is that the description of the data to be processed is completely independent from the data itself. The structure and format of the data are defined to MARK IV and stored in the MARK IV dictionary. This allows information to be processed in a logical manner based on the data in the file and the functions to be performed.**

**All levels of users can take advantage of the capabilities of the system to:**

- Create, maintain and read files
- Select records
- Extract data items and subfiles
- Compute results and summarize data
- Sort, sequence, and group output
- Format and print reports

**The full capabilities of MARK IV are available in an on-line timesharing environment using VM/370/CMS. In a simple interactive session, a user can define and create a file, write a request, execute a run, and have a report printed at the terminal or on a local or remote printer. All capabilities are also available in a Batch mode under VS.**

## Special Features

- The MARK IV system makes it possible to put management information quickly into the hands of the person who needs it.
- The system gives the analyst a tool providing increased performance capabilities for programming, coding and testing.
- The MARK IV system is finished, proven, and operational in a large number of installations.
- MARK IV allows the creation of a report or application system directly from specifications, minimizing programming.
- The MARK IV language reduces development and eases the process of modification of existing applications.

**MARK IV is a registered trademark of Informatics Inc.**

Company Name : **INFORMATICS INC. — DATA SERVICES DIVISION**

Headquarters Address : **6 Kingsbridge Road, Fairfield, NJ 07006**

Product Name : **MODEL 204**

Number of years commercially available : **7**

Date of last up-date or improvement : **October, 1978**

Approximate number of current users : **32**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Aage Reinertsen**

Telephone No.: **(201) 575-2800**

## General Description

**MODEL 204 is a proven data base management system offering multi-key access with rapid response, flexibility in data organization and safeguards for the privacy and integrity of data.**

**MODEL 204 uses an inverted file access method that searches lists to locate records in a data base that meet user specified search criteria without requiring access to the data itself. Data stored as MODEL 204 files can be retrieved on the basis of multiple retrieval keys. Any or all fields can be designated as key fields and used for retrieval. MODEL 204 data bases can be accessed or updated by any number of users. Security provisions are made to prevent unauthorized access or unauthorized updating of the file. Logic is built in to prevent simultaneous updating of the same record from multiple terminals.**

**The MODEL 204 user language is an easy to learn, powerful, general purpose language which allows users to compose, edit, and run data base management requests from terminals. Requests may be run at once or may be stored to be run later. Included in the user language are facilities for: information retrieval, file maintenance, mathematical calculations (full FORTRAN subroutine library), report generation and sorting. The cross referencing feature allows the user to dynamically relate data items across records, both within and between data bases.**

## Special Features

- **An easy to learn, easy to use, yet powerful, user language gets an application on-line fast**
- **Rapid retrieval for on-line queries gets the data when it's needed**
- **Data relationships are defined dynamically as needed by the user**
- **Freedom from rigid structures imposed by earlier data base systems**
- **The ability to change number of fields and field size without requiring reorganization or reprogramming allows open-ended application growth**
- **Security procedures protect the privacy of the data base and allow different access privileges to accommodate different types of users**
- **Simultaneous on-line and batch access to the same data is permitted**
- **MODEL 204 can be used directly by COBOL, PL/1, FORTRAN and BAL Programs**



Company Name : INFORMATICS INC. — DATA SERVICES DIVISION

Headquarters Address : 6 Kingsbridge Road, Fairfield, NJ 07006

Product Name : RAMIS II  
Number of years commercially available : 11  
Date of last up-date or improvement : April, 1978  
Approximate number of current users : 1,000 plus  
Purchase price if available on in-house equipment : \$34,000 - \$84,000  
Type(s) of equipment compatible for in-house use : Any IBM 360/370 135 or larger DOS/VS, OS/TSO, CMS  
Headquarters contact : Ted Clarke Telephone No.: (201) 575-2800

## General Description

RAMIS II is an integrated family of systems. Its five basic components are:

- Data Base Management System
- Records Management System
- Report Preparation System
- Programming Interface System
- Run Executive System

RAMIS II uses hierarchical files within a data base which can be networked if required to avoid redundancy, but can be processed separately for data maintenance. RAMIS permits access to multiple databases.

When reporting, users simply specify what information is wanted. RAMIS II retrieves the required data, analyzes and sorts it, and displays it. Thus, ad hoc reporting is simple and fast.

RAMIS II allows for multiple data input formats, sophisticated editing and logging capabilities and even "dry run" updating for screening input. RAMIS II can define and utilize fields which are not a part of the database. RAMIS II accepts data in all formats (binary floating point, etc.) RAMIS II can create a permanent file from data retrieved for a report, or remessage the same data for further reporting and/or graphing. RAMIS II functions can be batched and run or executed interactively in a conversational mode. Frequent functions can be catalogued for future use.

## Special Features

- Simple English user language quickly transforms questions and information requirements into results
- Powerful and sophisticated system to handle the most complex data processing requirements
- Financial planning subsystem that allows financial modeling and reporting
- Ability to use non-RAMIS file data in report generation
- Option of using own code routines at any point in the maintenance or reporting stage (FORTRAN, COBOL, Assembler, or PL/1)
- Interactive editor to add, change or delete records to any file
- Security at all levels: file, logical record, or individual field
- Graphing capabilities for trend analysis and pictorial comparisons of data (budgets comparative results, etc.)
- File structures, total databases and output reports can be expanded and modified easily after initial setup
- Hierarchical file structures reduce storage requirements and speed up data access

Company Name : **INTERACTIVE DATA CORPORATION**

Headquarters Address : **486 Totten Pond Road, Waltham, MA 02154**

Product Name : **XDMS\***

Number of years commercially available : **3.5**

Date of last up-date or improvement : **May, 1978**

Approximate number of current users : **250**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Product Manager, XDMS**

Telephone No.: **(617) 890-1234**

## General Description

**XDMS is a self-contained, general purpose data management and data retrieval system providing complete facilities for defining, creating, maintaining and interrogating data-bases. XDMS also features a high-level procedural language designed to facilitate the development and implementation of general on-line applications.**

**A Data Description Language is incorporated into XDMS providing a single source for defining all aspects and characteristics of the user's data-base. This description for a data-base becomes the primary source of information for determining how data is to be displayed, which report headings are to be used, to perform validity checks on data being added to or modified in the data-base, and to automatically prompt the user for required data items.**

**Complete facilities for data-base interrogation are provided in XDMS and data can be selected and sorted according to specified criteria. An Integrated Report Generating Facility provides data retrieval and report formatting functions to easily define report specifications, sort the selected data into defined sequence, and display the data on a user-specified device. XDMS provides the ability to produce simple lists or to prepare complex formatted reports with multi-level totals, averages, and other computations.**

**XDMS provides the means to perform arithmetic computations on data, to express relationships between various items of information, and to process character information.**

**\*XDMS is a Servicemark of Interactive Data Corporation.**

## Special Features

- **Workarea data-base for in-memory data manipulation**
- **Ability to save executable code for later program execution**
- **Data files created by other languages (COBOL, FORTRAN) are immediately accessible once a data-base description is established**
- **Ability to access multiple data-bases simultaneously**
- **Ability to produce multiple reports from a single pass of a data-base**
- **XDMS can be executed under control of programs written in COBOL, FORTRAN, PL/I or assembler. Conversely, subroutines written in these languages can be called and executed from an XDMS program**
- **A MACRO capability which allows the user to provide variable information during command computation giving the user the flexibility to dynamically modify the processing of XDMS commands**
- **Multi-dimensional array-handling facility**
- **Functions for accessing Interactive's financial data-bases**

Date: **May, 1979**

Submitted By: **Product Manager, XDMS**

Company Name : **INTERACTIVE DATA CORPORATION, Dynamics Associates Division**

Headquarters Address : **1033 Massachusetts Ave., Cambridge, MA 02138**

Product Name : **XSIM\***  
 Number of years commercially available : **Nine (9)**  
 Date of last up-date or improvement : **August, 1978**  
 Approximate number of current users : **500**  
 Purchase price if available on in-house equipment : **Prices available upon request**  
 Type(s) of equipment compatible for in-house use : **IBM, Amdahl, ITEL**  
 Headquarters contact : **Robert B. Anthonyson**

Telephone No.: **(617) 492-7500**

## General Description

**XSIM is an integrated system for information analysis, management, and display. It is a conversational system with a complete programming capability. The system integrates complete data analysis and display capabilities with access to user private data-bases and Interactive's financial, economic, and marketing data-bases. XSIM features include:**

- **STORAGE and MAINTENANCE** of large volumes of data which can be time-oriented, cross-sectional, or record-oriented.
- **Data TRANSFORMATION and ANALYSIS** including **SCREENING** and **SORTING** as well as the usual **ARITHMETIC, LOGICAL, and TIME-ORIENTED** operators.
- **MULTIPLE and STEPWISE** regression including a complete econometric language for specifying expressions as well as advanced econometric estimation methods
- **MODELING and SIMULATION** capabilities for solving large financial and econometric models characterized by sets of simultaneous equations
- **CAMERA-READY REPORTS** produced by a powerful report generator
- **TERMINAL GRAPHICS** and four-color **CONTINUOUS PLOTTING**.

**XSIM can store three types of data. Standard numeric data is used for computational efficiency. Precision data is used in cases where bookkeeping accuracy (up to 15 significant digits) is required. Alphabetic data is used to process non-computational data of up to 500 characters per item. All data in XSIM may be entered in free format and different data types can be mixed in the same series. In addition to on-line data entry from the user's terminal, data may be entered from cards, tape, or disk. Commands are provided to list and maintain the private data, and a specialized on-line editor allows convenient updating and correction of dataseries.**

**\*XSIM is a registered trade mark of Interactive Data Corporation. The program was developed and is maintained by the Dynamics Associates Division.**

## Special Features

**XSIM data is stored in a private on-line database as series (records) of items. Each series is given a name and can be accessed automatically via a directory that is created and maintained by the system. These series are accessed using highly efficient random access methods. An XSIM data-base can be shared with other authorized users.**

**A facility is available to maintain large data-bases that are primarily accessed sequentially or that are hierarchical in nature (tree structures). This facility operates using indexed sequential access methods. Explicit requests are made in XSIM to extract a subset of information from the large data-base so that the XSIM analytic and display capabilities can be applied. A powerful screening language is available for testing logical relationships among records up and down the tree, as well as for specifying conditions that must exist for fields within a record.**



Company Name : **INTERACTIVE MARKET SYSTEMS, INC.**

Headquarters Address : **19 West 44th Street, New York, NY 10036**

Product Name : **IMS Systems**

Number of years commercially available : **Nine (9)**

Date of last up-date or improvement : **Continually being enhanced**

Approximate number of current users : **500**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Richard Makely, President** Telephone No.: **(212) 869-8810**

## General Description

IMS offers advertising and marketing systems for the retrieval, analysis and display of data from more than 30 syndicated and numerous proprietary data bases. A wide variety of display, tabulation and statistical analysis reports for market and media planning can be produced.

Consumer product companies, ad agencies, the media and research companies use IMS to analyze advertising and marketing information. IMS users are primarily marketing and media planners, many with little or no computer or statistical experience.

The IMS systems process and analyze advertising and marketing data bases, either individually or in combination. These bases contain national, regional and local information, including demographic, media, and product data. The data bases with which IMS works include, among other: Arbitron TV, Arbitron Radio, Arms II, Audits and Survey, Axion-TGI, BAR Network TV, BAR Spot TV, Belden Associates, Brand Tracking Studies, Canadian Print Meas. Bur., Census, Client Sales Data, Consumer Panel Data, MRCA Textile Panel, Nielsen Station Index, Nielsen TV Index, Arbitron-NPA, J.D. Powers, Purchase Influence, ORC Youth, Polk, Sales Management, SAMI, W.R. Simmons, SRDS, Starch Elite, British TGI, British National Readership Survey, and Pan-European Survey.

IMS provides consulting and programming services for the development of clients' marketing and advertising information systems.

Clients are serviced from offices in London, England, Toronto, Canada, New York, Chicago, Atlanta, Los Angeles, and Honolulu.

## Special Features

Systems allow easy English language access to procedures and provides English language coding for major database information.

Offers integration of such disparate data bases as BAR and ARB, TGI and ARB, Purchase Influence and W.R. Simmons.



Company Name : I.P. SHARP ASSOCIATES LIMITED

Headquarters Address : 145 King Street West, Toronto, Canada M5H 1J8

Product Name : MAGIC

Number of years commercially available : Four (4)

Date of last up-date or improvement : January, 1979

Approximate number of current users : 300

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : David Keith

Telephone No.: (416) 364-5361

## General Description

MAGIC is a system for retrieving, manipulating and displaying time series data. Operating in an interactive environment, it is simple to use even by the user who knows nothing about computer programming. Time series data of a monthly, quarterly or yearly nature can be manipulated to produce detailed analysis or high quality plots and graphs

One can create and maintain private user-defined time series which belong to the user's private number. MAGIC is an invaluable tool for analyzing this data for such applications as budgeting, revenue and expense analysis, financial planning, and inventory tracking.

Forecasting and statistical calculations such as moving average, standard deviation, percentage growth rate, multiple regression and X-11 seasonal adjustment are easily accomplished using the MAGIC system.

Several public time series data bases on the SHARP system can be successfully linked to MAGIC. These include:

- Civil Aviation data base (CAB)
- National Bureau of Economic Research data base (NBER)
- CANSIM minibase (Maintained by Statistics Canada)
- U.S. Wholesale and Consumer Price Indices
- Stock Exchange data (Maintained by Financial Post)
- Canadian Banks data base

The manual "MAGIC For Time Series Analysis" can be obtained by contacting the above phone number or your local I.P. Sharp Branch Office.

## Special Features

- The user does not operate under an imposed structure but rather, creates his own set of programs completely geared towards his own needs.
- MAGIC was designed to permit those with some knowledge of the APL programming language, the flexibility to perform tasks not inherent in the MAGIC system.
- MAGIC is capable of handling a single time series or several time series in the same operation.
- The SUPERPLOT plotting package of MAGIC allows for high quality graphical plots of public or private data.

Company Name : **MCDONNELL DOUGLAS AUTOMATION COMPANY (MCAUTO)**

Headquarters Address : **P. O. Box 516, St. Louis, MO 63166**

Product Name : **SYSTEM 2000\***

Number of years commercially available : **7**

Date of last up-date or improvement : **January, 1979**

Approximate number of current users : **Confidential**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Network User Support**

Telephone No.: **(314) 232-8121**

## General Description

**SYSTEM 2000** is a general purpose, user-oriented database management system available interactively or in batch on MCAUTO's Cyber Service. Featuring a self-contained English-like command language, it allows the non-programmer to create, load, access, and update databases without the high cost and long lead times of program implementation and change. Tailored applications linking data fields into hierarchical relationships can be created by placing frequently used commands into customized command "strings." Using **SYSTEM 2000**, it is possible to prototype an application, use it with live data, and refine it as experience warrants without expensive programming and reprogramming efforts.

**SYSTEM 2000** is appropriate for a wide range of applications and for databases ranging from 250,000 to 50,000,000 characters and beyond.

Three major modules comprise **SYSTEM 2000**. The Natural Language Interface is used by the nonprogrammer to update and retrieve data, it also is used to define and modify a database structure and for general database administration including control of security for the database. The Report Writer module is designed to provide flexible output formatting capability including sorting, subtotalling, footnoting, and user defined arithmetic calculations. Finally, the Host Language Interface allows the programmer to access up to four Databases simultaneously from FORTRAN or COBOL to accomplish tasks including interfaces to other applications.

Several features of the Cyber Service have done much to enhance the useability of **SYSTEM 2000**. Included are special operating system commands to access the various modules, to route output files to high speed printers, and to load existing data. Utilities to estimate database size are also available.

\***SYSTEM 2000** is a registered trademark of MRI Systems Corporation, Austin, Texas.

## Special Features

- Passwords are used to restrict data access down to the field level.
- Selected fields may be designated as "key" fields causing inverted lists to be maintained to improve data access.
- "Queue mode" can greatly decrease update costs by performing updates in groups.
- Report Writer can produce up to 100 reports with one pass over the database.
- Complete documentation, training, and consulting services are available through MCAUTO.

Company Name : MELLONICS INFORMATION CENTER - LITTON SYSTEMS, INC.

Headquarters Address : 6701 Variel Avenue, Canoga Park, CA 91303

Product Name : IMS/VS

Number of years commercially available : 4

Date of last up-date or improvement : August, 1978

Approximate number of current users : 100

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : IBM

Headquarters contact : John L. Cudworth

Telephone No.: (213) 887-5100

## General Description

IMS/VS is a general purpose data base/data communications (DB/DC) interface between the operating system and user-written application programs (written in ANS COBOL, VS COBOL, PL/I, ASSEMBLER or FORTRAN). The IMS/VS DC system permits multiple users in development or production systems to retrieve and update private data bases on-line. Complete security and transaction accounting is provided. IMS/VS, with its wide selection of supporting components and flexibility of application design, substantially reduces the development time, personnel, and overall cost involved in applications development.

Supporting components of IMS/VS at MIC include: DBPROTOTYPE (for design or redesign of DB), ADF (Application Development Facility - Rapid Application Development), STAIRS (DB Document Storage), SPACE MANAGEMENT UTILITIES - II (Segment Restructure, Tuning Aids, Pointer Checkers, Physical Block Reloading and Space Management), SIP - Screen Image Preprocessor (provides rapid development of screen formats), Fast Scan (a variety of DB unload capabilities), IMSMAP (Documentation facility), BTS-II - Batch Terminal Simulator (for off-line development of on-line applications), GIS - Generalized Information System (for general inquiries with ease of use), MARK-IV, and the UCC-10 Data Dictionary for complete system documentation and implementation.

## Special Features

- IMS/VS VSAM shared resource support which can reduce main storage requirements (both fixed and variable) by sharing buffers and control blocks across VSAM data sets.
- Secondary indexing of IMS/VS data-bases automatically maintained by the system. VSAM must be used for the index data-bases.
- Variable Length Segments in IMS/VS data-bases whose data length can be dynamically changed to best meet the needs of variable information. These data-bases must be VSAM.
- Edit/Compression Routine to include user-written encode/decode routines to improve the utilization of direct access storage space for data-base storage space. This feature is available for VSAM data sets only.



Company Name : MELLONICS INFORMATION CENTER - LITTON SYSTEMS, INC.

Headquarters Address : 6701 Variel Avenue, Canoga Park, CA 91303

Product Name : RAMIS II

Number of years commercially available : 10

Date of last up-date or improvement : December, 1978

Approximate number of current users : 75

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : IBM

Headquarters contact : John L. Cudworth

Telephone No.: (213) 887-5100

### General Description

RAMIS II is an integrated family of five basic systems:

- Data Base Management System
- Records Management System
- Report Preparation System
- Programming Interface System
- Run Executive System

RAMIS II uses hierarchical structured files within a data base which can be networked if required to avoid redundancy. Files can be processed separately for easy data maintenance. RAMIS II permits access to multiple databases.

When reporting, users simply specify what information is wanted. RAMIS II retrieves the required data, analyzes and sorts it, and displays it. Thus, ad hoc reporting is simple and fast.

RAMIS II allows for multiple data input formats, sophisticated editing and logging capabilities and even "dry run" updating for screening input. RAMIS II can define and utilize fields which are not a part of the database. RAMIS II accepts data in all formats (binary floating point, etc.). RAMIS II can create a permanent file from data retrieved for a report, or remassage the same data for further reporting and/or graphing. RAMIS II functions can be batched, and run, or executed interactively in a conversational mode. Frequent functions can be catalogued for future use.

RAMIS II is a product of Mathematica Products Group, Inc.

### Special Features

- Simple English instructions quickly transforms questions and information requirements into results.
- Powerful and sophisticated system to handle the most complex data processing requirements.
- Ability to report from files external to the RAMIS II database.
- Option of using own code routines at any point in the maintenance or reporting stage (Fortran, Cobol, Assembler, PL/1)
- Interactive editor to easily add, change or delete records to any file.
- Security at all levels, file, logical record, or individual field.
- Graphing capabilities for trend analysis and pictorial comparisons of data (budget as comparative results, etc.)



Company Name : MELLONICS INFORMATION CENTER - LITTON SYSTEMS, INC.

Headquarters Address : 6701 Variel Avenue, Canoga Park, CA 91303

Product Name : TOTAL

Number of years commercially available : 10

Date of last up-date or improvement : September, 1978

Approximate number of current users : 50

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : IBM

Headquarters contact : John L. Cudworth

Telephone No.: (213) 887-5100

## General Description

TOTAL, owned by CINCOM Systems, is available on MIC's national telecommunications network. TOTAL provides a Data Base Definition Language (DBDL) to define a data base for TOTAL's organization and management. The Data Management Language (DML) provided by TOTAL is used to access and manipulate the data base. DML commands are issued in user programs through subroutine CALL statements, and include such functions as opening and closing a data base, accessing and manipulation of data sets, serial processing of data sets, and data record logging.

TOTAL provides data independence from program changes, as well as program independence, and may be used in both batch and time-sharing environments. Used in conjunction with MIC's extensive communication network and central computing facility, TOTAL is capable of satisfying the most advanced applications requirements.

## Special Features

A TOTAL data base consists of master and variable data sets. A master data set is accessed through a key field, and may be stand-alone or linked to one or more variable files. TOTAL maintains all linkages internally, so that the integrity of the data base is guaranteed.

The host program may be written in either FORTRAN or COBOL.

Only those data sets required by an application need to be referenced by the user program, so that one physical data base can appear as many logical data bases.

TOTAL provides both hierarchical and network structures.



Company Name : MITROL, INC.

Headquarters Address : 1050 Waltham Street, Lexington, MA 02173

Product Name : MIMS (MITROL INDUSTRIAL MANAGEMENT SYSTEMS)

Number of years commercially available : 6

Date of last up-date or improvement : March, 1979

Approximate number of current users : 55

Purchase price if available on in-house equipment : 1\*

Type(s) of equipment compatible for in-house use : 2\*

Headquarters contact : Richmond Woodward

Telephone No.: (617) 862-6350

## General Description

The MIMS system is an integrated management information and control system for industry. It is now used in the following application areas, and can easily be extended to others:

- Engineering (Bills of Materials)
- Inventory Control
- Production Control and Shop Floor Tracking
- Purchasing and Receiving
- Sales Order Tracking
- Material Requirements Planning (MRP)
- Capacity Planning
- Financial Planning and Cost Control
- Configuration Management (both engineering drawings and serial number lot tracking)

The MIMS system includes:

- A generalized network-model database management system designed following CODASYL standards, to enable a centralized file system.
- An English-like query language allowing user definition of updating transactions and of reports, and/or the database itself.
- Specialized requests for industrial management applications (cost roll-ups, what-if cost stimulations, stock-room kitting, etc.)
- An MRP consistent with the most recent concepts and development in industrial management.

MIMS is available as a timesharing service with batch capabilities, or it can be purchased for in-house use. Implementation of a full manufacturing control system with MIMS takes less than a month, and the resulting system can easily be modified to meet new requirements.

## Special Features

- Facilities to produce comprehensive audit reports of all or of user-selected transactions.
- Computed fields, which are automatically updated as other field values change.
- Files, fields and relations can be defined to satisfy the special requirements of a wide variety of manufacturing applications.
- Material Requirements Plan can produce any number of user defined reports, each with different formats and presentation of data, including Peg reports for requirements and work-center loading.
- English-like Request Language is easily learned by people without programming background.

1\*\$175,000 plus maintenance; lease plan also available.

2\*IBM 370/138 or larger, with 512K real memory; operating system requirements VM/CMS or OS/VS.

Date: May, 1979

Submitted By: Arthur J. Fink, Director of Training and Documentation

Company Name : **MRI SYSTEMS CORPORATION**

Headquarters Address : **12675 Research Blvd., P.O. Box 9968, Austin, TX 78759**

Product Name : **SYSTEM 2000®**

Number of years commercially available : **Nine (9)**

Date of last up-date or improvement : **Periodically at 3-4 month intervals**

Approximate number of current users : **600**

Purchase price if available on in-house equipment : **Sold in modular form. Average minimum, \$65,000; average maximum, \$110,000**

Type(s) of equipment compatible for in-house use : **IBM 360/370, CDC 600, 760, CYBER, UNIVAC 1100, and AMDHAL 470 systems**

Headquarters contact : **James P. Devlin**

Telephone No.: **(512) 258-5171**

## General Description

**SYSTEM 2000** is a general-purpose data base management system that provides users with both a set of self-contained, or natural language, facilities and a host-language interface or programming facility for use with COBOL, FORTRAN, PL/I, or Assembler languages. It is internationally marketed and supported by MRI Systems Corporation, MRI's authorized distributors and 24 commercial RCS vendors licensed to sell **SYSTEM 2000** services. Along with being available to time-sharing users on a royalty basis, **SYSTEM 2000** is available to organizations with in-house computers under a variety of lease and rental plans. Organizations thus have a wide variety of options in selecting a procurement plan best suited to their budgets and application needs.

One of **SYSTEM 2000**'s major benefits is *portability*. Operating equally well on IBM 360/370, AMDAHL 470, UNIVAC 1100, and CDC 600/CYBER series computers, **SYSTEM 2000** makes it quite simple for organizations to move data and applications from one machine to another and from in-house computers and those maintained at licensed RCS installations. The communication network provided by these licensed vendors makes **SYSTEM 2000** services potentially available to almost all interactive terminal users. All that is needed is a telephone call.

**SYSTEM 2000** is "user friendly." It provides non-programming users with a full range of capabilities for creating data base definitions or schemas, for loading both large and small data bases, for updating and maintaining the data, for retrieving data to answer almost any kind of question the data permit, and for generating special, user-prescribed reports. Users can easily modify data base schemas, as experience dictates, even while they are making production use of the data base.

Another **SYSTEM 2000** benefit is that it is modularly expendable. Meeting the requirements of both large and small data base applications, **SYSTEM 2000** permits each user to tailor it to his specific needs and budgetary constraints. Users do not have to install all features all at one time.

**SYSTEM 2000** provides data base administrators with multiple levels of security to protect the integrity of data bases. It also has features to help users monitor and control the performance of their applications.

## Special Features

- **SYSTEM 2000**'s self-contained query/update language, which uses an easily learned English-like syntax, provides non-programmers with an easy means of querying and updating a data base. Including a complete set of easy-to-understand diagnostic messages, it is ideally suited for interactive use from remote keyboard terminals.
- **SYSTEM 2000**'s programming facility, or host-language interface, spares application programmers and others from many file-definition and file-maintenance chores in manipulating a data base with such procedural or programming languages as COBOL, FORTRAN, PL/I, or Assembler languages. It significantly speeds up development of custom applications.
- **SYSTEM 2000**'s Report Writer, for which there is a self-contained language, enables users to specify and control the content and format of special reports and to generate as many as 100 reports for a single pass of relevant data-base files.
- **SYSTEM 2000**'s data dictionary/directory, called **CONTROL 2000®**, significantly enhances the power of the data base administrator to control information concerning data elements, files, programs, and data bases.



Company Name : NATIONAL CSS

Headquarters Address : 187 Danbury Road, Wilton, CT 06897

Product Name : NOMAD

Number of years commercially available : Five (5)

Date of last up-date or improvement : October, 1978

Approximate number of current users : 1000

Purchase price if available on in-house equipment : Available upon request

Type(s) of equipment compatible for in-house use : IBM compatible 360/370

Headquarters contact : David S. Lipson

Telephone No.: (203) 762-2511

## General Description

National CSS has been a leader in interactive database services since 1970 with its NOMAD proprietary database management system. NOMAD has three major functions:

**COMPREHENSIVE DATABASE DEFINITION (SCHEMA)** — The user has total control over database specification including:

- attributes of data items — name, alias, limit, mask, access options, internal and external formats (including extensive date and name handling), calculations, member of a set, report heading, encoded value.
- Data relationship — For segments or groups or related data items: name, alias, multiple key items, access options, order of data insertion, complex retrieval and update tests, look-up options. NOMAD supports 3 structures: relational, hierarchical and a combination of the two.
- Security — passwords, multiple database views (subsets), NBS encipher, retrieval and/or update protection.

### PROCEDURAL AND NON-PROCEDURAL DATABASE MAINTENANCE

- Interactive editing: locate, change (specific instance or throughout database), delete (specific or throughout), insert, replace, next, previous, first, last, step, key, mark and move.
- Automatic file processing — User describes transactions and type of maintenance in one command, NOMAD positions the database and processes.
- Full-user Control — User specifies positioning, transactions and processing through procedural commands; including symbolic substitution.

**FLEXIBLE REPORTING** - Types of output include tables, reports, memos, labels either from entire database or selected portion. NOMAD can fill in forms, generate subfiles, produce multiple reports per page or per pass, use high speed printers, join multiple databases, and operate in BATCH mode.

## Special Features

- Allows database to be reorganized (add or delete items or segments, etc.), without a dump and reload and without having to rewrite existing maintenance and reporting procedures.
- Automatically restores database in event of system failure.
- Distinguishes between fields with no value and blank or zero.
- Allows reporting from external files (e.g. ISAM files).
- Has host program interface to COBOL, FORTRAN, BAL, PL/I.
- Offers BTREE accessing for efficient inquiring into large databases.
- Has extensive error handling capabilities within procedural environment.
- Has automatic database performance analysis.
- Has save/restore feature for "what-if" analysis.
- Easy interface to graphics.

Company Name : **ON-LINE SYSTEMS, INC.**

Headquarters Address : **115 Evergreen Heights Drive, Pittsburgh, PA 15229**

Product Name : **OLIVER**

Number of years commercially available : **Nine (9)**

Date of last up-date or improvement : **December, 1978**

Approximate number of current users : **Over 150**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Don C. Tarkenton** Telephone No.: **(412) 931-7600**

## General Description

**OLIVER is a powerful, user-oriented data base management system designed to operate in both interactive and batch time-sharing environments. The system is totally integrated and combines all the functional features needed for effective data base management. OLIVER is currently being used in a wide variety of applications, including inventory control, accounting, order entry, personnel, finance, marketing analysis, budgeting, and correspondence tracking.**

**OLIVER provides the user with:**

- **DATA DEFINITION** - A wide range of field types: numeric, alphanumeric, date, table lookup, repeating groups; hierarchical and network structures; fixed and variable length fields; 40 to 70% compaction of data; and dynamic file modification.
- **INFORMATION STORAGE AND RETRIEVAL** - Interactive record creation and deletion; data updating at the field level; instantaneous query and retrieval; simultaneous user access/updates; and optimized search strategies.
- **INSTANT REPORT GENERATION** - Complete user control; titles, headings, footings; unlimited control breaks; summarization at any level; up to 36 sort expressions; and single or multiple files.
- **DATA BASE RESTRUCTURING** - Dynamically invert fields; add fields; and modify validation limits.
- **DATA INTEGRITY** - Validation limits and audit trails.
- **SECURITY** - File, record, and field passwords; encryption of data and passwords.

## Special Features

- Arithmetic, Boolean, and relational operators
- Comprehensive error diagnostics, including traceback
- Interfaces to FORTRAN, COBOL, and APL
- Multiple file capabilities include updating, query, and reporting
- Run time linkage of data bases
- Transposed, indexed sequential, and inverted access techniques
- Command files for storing report generation and updating routines
- Up to six levels of nesting command files
- Transaction processing facility for batch updating
- Built-in editor
- Extensive date arithmetic capabilities
- Utility for developing applications using CRT screens
- Interfaces to OLS systems for graphics, financial modeling, statistics, and project management

Company Name : **RAPIDATA, INC.**

Headquarters Address : **20 New Dutch Lane, Fairfield, NJ 07006**

Product Name : **DBMS-10**

Number of years commercially available : **6**

Date of last up-date or improvement : **September, 1978**

Approximate number of current users : **150**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Victoria Wright**

Telephone No.: **(201) 227-0035**

## General Description

DBMS-10 is a generalized database management system for sequential, hierarchical (tree structured), and complex network-structured databases. Developed by Rapidata, Inc., DBMS-10 is based directly on the April, 1971 report of the CODASYL Data Base Task Group. Digital Equipment Corporation provides DBMS-10 as unbundled software for DECsystem-10 installations. The DBMS-10 software system provides the nucleus for X2C, a high-level, user-oriented data management language developed by Rapidata and offered via its time-sharing services.

DBMS-10 allows data to be structured in a manner most suitable to each application, regardless of the fact that some or all of that data may be used by several applications; this flexibility is achieved without requiring data redundancy. The consequential reduction in storage makes large files small, and impractical applications cost-effective. The lack of redundancy also means that since specific data is stored only once, a single update run ensures that all applications referencing that data are updated simultaneously.

DBMS-10 relieves the applications programmer of most of the burden of "data management overhead". On the other hand, the analyst has unlimited flexibility in designing the database (there are few constraints placed on the data structure or the number of fields, records, sets, or areas). These factors, combined with the variety of search strategies that can be employed against a database, enable the proper emphasis to be placed on the "data" aspect of the application system.

## Special Features

- **DATA RELATIONSHIPS:** supports network hierarchical, random-access, and sequential views of the data
- **DATA INDEPENDENCE:** existing programs are NOT AFFECTED by database reorganizations
- **DATA INTEGRITY:** lack of data redundancy ensures integrity across applications; retention of updated data images and/or audit trails of transactions are available
- **SECURITY:** privacy locks are provided at the area and the subschema levels; any number of individual user views of the database can be established
- **CONTROL:** centralized database control and administration mechanisms are provided
- **INTERFACE LANGUAGES:** DBMS-10 databases are accessible via COBOL, FORTRAN, X2C, PROBE and FISCAL



Company Name : **RAPIDATA, INC.**

Headquarters Address : **20 New Dutch Lane, Fairfield, NJ 07006**

Product Name : **X2C**

Number of years commercially available : **3½**

Date of last up-date or improvement : **February, 1979**

Approximate number of current users : **200**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Victoria Wright** Telephone No.: **(201) 227-0035**

## General Description

**X2C is a high-level data management language that accesses both sequential and structured databases. Designed to be used by both the casual user and the experienced programmer, X2C combines the convenience of an ad-hoc reporting capability with the procedural flexibility and operating efficiency required in complex or production-oriented data management applications. With X2C, even the non-database programmer can easily perform retrievals from or updates to complex network structured DBMS-10 databases.**

**X2C screens master files, performs computations and other programming language functions, and reports the data in any desired format; at the same time X2C also posts transactions against master files and generates audit trails. An unlimited number of reports can be generated via a single pass through the database; each report or group of reports can be sorted differently than the input data. X2C retrieves and updates data in single or multiple-record type sequential files, as well as the most complex hierarchical or network structured DBMS-10 databases.**

**One of the key attributes of X2C is the concise nature of its language. X2C programs inherently consist of a relatively small number of instructions (a single statement can scan an entire database, collecting all records that satisfy specific conditions). This enables applications to be coded more quickly and more reliably than could normally be achieved, and makes changes or additions to application programs easy to implement.**

**Another major attribute is the very highly structured nature of the language. Because many operations are performed implicitly, X2C programs are typically developed on a series of stand-alone segments. The resulting block structure speeds development and simplifies maintenance and application expansion.**

## Special Features

- **END-USER LANGUAGE:** X2C syntax is a high-level, English type language that is easily learned by non-programmers.
- **AD-HOC INTERROGATIONS:** Built-in automatic search and screening capabilities facilitate browsing through databases.
- **REPORT-WRITER:** X2C's strongest capability - reports are specified in non-programming terms.
- **MULTIPLE REPORTS:** An unlimited number of individually-tailored reports can be generated in a single pass through the database.
- **AUTOMATIC SORTING:** Any number of different sort sequences can be specified for a single run; a given sort sequence can apply to one or several different reports.
- **DATABASE UPDATING:** Transaction data can be automatically posted against sequential files, or against hierarchical or network structured DBMS-10 databases.
- **PROGRAMMING LANGUAGE CAPABILITIES:** X2C contains a wide range of procedural capabilities including arithmetic calculations, string manipulations, sub-programs, data comparisons, looping, branching, table look-ups, and date arithmetic.





Company Name : ROSS SYSTEMS, INC.

Headquarters Address : 1900 Embarcadero Road, Suite 208, Palo Alto, CA 94303

Product Name : DATATRIEVE-11

Number of years commercially available : 2

Date of last up-date or improvement : n.a.

Approximate number of current users : Confidential

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : PDP-11

Headquarters contact : John Benedict

Telephone No.: (415) 326-1054

## General Description

DATATRIEVE-11 is a general-purpose, interactive data base system and report writer. DATATRIEVE can be used to manipulate ISAM or sequential data files. The user defines a DATATRIEVE data base with a COBOL like record description and can then add, change, delete or report on records in the data base using English type of language. DATATRIEVE is extremely easy to use for the novice, yet contains a number of powerful features for the more sophisticated user. DATATRIEVE files can be accessed by COBOL or BASIC-PLUS 2 programs for other functions.

## Special Features

- General, English query commands
- Multi-key ISAM files
- Procedures for data entry and inquiry
- On-line "help"
- Flexible and easy to use report writer



Company Name : **THE SERVICE BUREAU COMPANY**

Headquarters Address : **500 West Putnam Avenue, Greenwich, CT 06830**

Product Name : **MINI-MIS EXTENDED (MMX)**

Number of years commercially available : **Over 4**

Date of last up-date or improvement : **Continual Enhancements**

Approximate number of current users : **Several thousand applications in over 1,000 companies**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Contact your local SBC Time-Sharing Office** Telephone No.:

### General Description

MINI-MIS is SBC's facility for inquiring into, reporting from, and maintaining files of data on Call/370 Management Time-Sharing. It offers a surprisingly convenient, cost-effective way to make your data, whether personnel records, inventories, budgetary accounting, sales records, or similar collections, interactively available via a local call into an international network. Three generations of MINI-MIS systems are now available. The first, which began in 1969, was a series of independent utility programs for sorting, updating, reporting, etc. for sequential files and later also for indexed sequential files. The most recent MINI-MIS system, MMX, is a self-contained, command driven system.

MINI-MIS is indeed a "mini" in terms of implementation time, training and the overall investment required to try out an application. But its design recognizes that your problems will probably call for carefully controlled updating, special processing, and that your "satellite users" may need to be "led by the hand" to obtain the reports they need. While a quick report can be obtained easily, MMX also lets you add a considerable variety of special processing logic, using its own language tools. You can even insert the special processing logic right into the data base definition file, for the benefit of all end-users.

Using the "Conversational Reporting" facility in the most recent MMX system, a few simple answers to helpful, structured questions can cause a highly presentable report to be produced quickly. With this feature, users with a need to know, but no experience even with a reporting language, can satisfy many of their own reporting needs.

### Special Features

- Multiple levels of subtotals and group headings
- Tables can hold descriptions for codes in the files
- Automatic, partially automatic, or user-controlled formatting
- Multiple reports can be created in one pass
- "Test" reports can be produced with a limited number of records
- Questions, in the user's language, can help customize a report
- "Programming" statements for virtually any special processing
- Synonyms can be defined, to accommodate diverse terminologies
- Pre-processed specifications can enhance efficiency
- On-line bulletins describe the continuing enhancements
- Auxiliary files can pass selected data and/or subtotals to other SBC systems such as PICTURE-PAC for graphics, PROPHIT II for modeling, DATAPACK for statistics and TIMEPACK II for time series analysis and forecasting -- all are part of SBC's Business Information Services for Planning, Analysis, and Control (BIS-PAC).

Company Name : **STANDARD & POOR'S FIXED INCOME SYSTEMS**

Headquarters Address : **100 California St. - Penthouse, San Francisco, CA 94111**

Product Name : **Fixed Income Management Services (FIMS)**

Number of years commercially available : **Four (4)**

Date of last up-date or improvement : **January, 1979**

Approximate number of current users : **20**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **C. James Reuter** Telephone No.: **(415) 398-4203**

## General Description

An advanced on-line interactive system for fixed income portfolio analysis and control, tailored to the needs of financial institutions.

FIMS enables investment managers, controllers and treasurers to have instant access to every data item of significance on the fixed income securities they hold in their portfolios. Summary and detailed information can be retrieved in minutes through the use of desk-top terminals, with either cathode-ray tube or hard copy capability. In addition, a full complement of monthly reports is available for those responsible for portfolio management, accounting, and control.

**Centralized data file:** Provides common source of current, accurate information to every user within an institution on all fixed income securities. All accounting data is available to provide maximum detail for decision making and regulatory compliance.

**Current price data:** FIMS users, with the aid of our unique municipal bond market model, can value their portfolios in minutes - an operation that manually can take days or weeks.

**Analytical features:** FIMS allows users to employ a variety of computer analysis techniques to find specific bond swap candidates, evaluate portfolio strategies, and verify accounting information.

**Graph prints:** Portfolio managers can print yield curves to reflect the market place in the past, present, or future based on their own economic forecasting.

## Special Features

**Portfolio Valuation:** Update and value portfolio in minutes (past, present, or future)

**Amortization/Accretion:** Select either straight-line or scientific methods and determine correct book values. Track book values on daily, weekly, or monthly basis.

**Income accruals:** Set any two dates and identify income accrued during that period (since the last coupon) or the amount due at the next coupon payment date.

**Search & Select:** Request information on bond fields such as par, cost, coupon, yield, maturity, pledge, security type, etc. and the system identifies the items meeting that criteria. This data is summarized and displayed immediately on the terminal.



Company Name : SYSTEM AUTOMATION CORPORATION

Headquarters Address : 8555 Sixteenth St., Silver Spring, MD 20910

Product Name : REQUEST Data Base Management System

Number of years commercially available : One (1)

Date of last up-date or improvement : January, 1979

Approximate number of current users : 100+

Purchase price if available on in-house equipment : \$30,000

Type(s) of equipment compatible for in-house use : Univac 1100, IBM 370, DEC 10

Headquarters contact : Harvey Kramer

Telephone No.: (301) 565-9400

## General Description

The REQUEST Data Base Management System is a set of programs and procedures used to create, access, maintain, backup, and recover a data base. The user views the REQUEST data base as a network of data sets. The structure of the data base is described in a data dictionary. The data dictionary is used to format the data base shell and to describe the data base to all REQUEST programs and procedures.

REQUEST has two types of users: A Data Base Administrator (DBA) and an Application Level User (ALU). The DBA organizes and controls the data base. The ALU accesses the data base for a single application. The ALU may be a programmer or a user of the REQUEST query/update system.

REQUEST uses two types of data sets: a master and a detail. A master data set contains records with uniquely defined keys and may be pointed to or may point to another data set. A detail data set contains records which do not have unique keys and may be pointed to by a master data set.

REQUEST uses three types of links: one-to-many, one-to-discrete, and many-to-one. A one-to-many link may be sorted. A link may be manual or automatic. A manual link requires that the "from" record exist before the "to" record is created. An automatic link creates the "from" record if it does not previously exist. A link may be compulsory or optional. A compulsory link is established for all values of the link data items. An optional link is not established for pre-specified values of the link data items but is established for all other data item values.

The data base may be accessed either by programs which call REQUEST procedures or by the REQUEST query/update system. The query/update system is designed for non-ADP type users and is completely interactive. The query/update system may also be used to produce batch reports.

## Special Features

- Distributed Data Bases
- Sorted Links
- Routines which are callable from FORTRAN or COBOL
- Network View
- *Ad Hoc* query/update system
- Variable Length Records
- Packed Data
- Special Computations
- Maintenance Utilities
- ISAM Retrieval from Master Data Sets

Company Name : TYMSHARE, INC.  
Headquarters Address : 20705 Valley Green Dr., Cupertino, CA 95014

Product Name : FOCUS  
Number of years commercially available : Three (3)  
Date of last up-date or improvement : January 19, 1979  
Approximate number of current users : 400  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Rich Carlson  
Telephone No.: (408) 446-6306

### General Description

FOCUS is a comprehensive information control system developed by Information Builders, Inc. It contains facilities for describing files, both simple, and complex interconnected ones; for entering, changing, and deleting records in the files; and for preparing reports from information in the files. The purpose of FOCUS is to control an entire application and thereby reduce the need for, or replace computer programming. The system is structured so that it can be used by non-programmers as well as programmers.

- Brief English language statements are used to prepare reports. The statements indicate which records are to be retrieved, what calculations are to be performed, the sort sequence of output lines, etc. Reports may be simple listings, or may solve complex problems for the user.
- File structures possible in FOCUS include hierarchical, shared hierarchical, networked linked, and cross-referenced pattern. File views provide inversion, and multiple entry point capability. All of the modern file structures are available for simplifying the storage of information. A simple quasi procedural language is provided for adding, deleting and changing records. It includes extensive transaction validation, computational and logging facilities to replace the need for computer programs for records maintenance.
- Host Language Interface permits programs in COBOL, FORTRAN, or PL-1 to access FOCUS files. Programmers can then use the FOCUS file structuring facilities to reduce programming time in customized situations.

### Special Features

The Report Request Language can also be used on existing files which are maintained by non-FOCUS systems. FOCUS' Report Request Language also provides easy to use commands for specifying contents and formatting of bar charts, histograms, connected point plots, etc. Output may be on any character type terminal including high resolution devices designed for graphics.

Statistical analysis is available to aggregate, select and redefine data for analysis using a variety of statistical functions and analysis routines. Functions such as multiple linear regression and correlation analysis are built into FOCUS.



Company Name : TYMSHARE, INC.  
Headquarters Address : 20705 Valley Green Dr., Cupertino, CA 95014

Product Name : **MAGNUM**  
Number of years commercially available : **Four (4)**  
Date of last up-date or improvement : **December 1, 1978**  
Approximate number of current users : **150**  
Purchase price if available on in-house equipment : **n.a.**  
Type(s) of equipment compatible for in-house use : **n.a.**  
Headquarters contact : **Rich Carlson** Telephone No.: **(408) 446-6306**

### General Description

**MAGNUM** is one of the first commercially developed interactive database systems that utilize a "relational" concept. This means that data is organized in a fundamentally different fashion than in conventional (hierarchical or network) systems. In **MAGNUM**, all data elements (fields) and relations are separate and equally available in a database. They can, therefore, be accessed in any fashion, sequence, or relationships which meets a particular user's need at any given time. There are no rigid "parent-subordinate" paths to observe as in many other systems.

**MAGNUM** is a higher level language of extreme power, enabling non-programmer users to execute very complex and detailed processes with a minimum of instructions. It is at such a high level of abstraction from the machine world that powerful procedures can be written by people having no prior programming experience with just a few hours of familiarization.

Many standard data management functions can be executed simple by employing any of **MAGNUM**'s eight command statements.

### Special Features

The **MAGNUM** data management language was specifically created for performing transaction data management and processing functions.





Company Name : UNITED COMPUTING SYSTEMS, INC.  
Headquarters Address : 2525 Washington, Kansas City, MO 64108

Product Name : IFM  
Number of years commercially available : 4  
Date of last up-date or improvement : July, 1978  
Approximate number of current users : 3,500  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Allan Klein and Curt Beane  
Telephone No.: (816) 221-9700

## General Description

United Computing's Interactive File Manager (IFM) functions as both a file manager and a data-base system. While IFM can perform routine file maintenance requirements, it is also capable of handling such sophisticated applications as inventory control, personnel management, and sales and accounting information systems.

IFM has been designed to give the user a greater degree of control over the system. IFM has a vocabulary of 13 commands. The procedural commands are: HELP, DEFINE, SCAN, SORT, MERGE, PRINT, SELECT, UPDATE, RESTORE, REPORT, EXECUTE, PROCEDURE, MACRO.

Day-to-day uses of IFM include sorting, file reformatting from free-field to fixed-field records and vice versa, data scanning for illegal values, reporting, file updating and retrieval. These file maintenance and management functions of IFM effectively eliminate the need for small, specially developed programs in FORTRAN, BASIC, COBOL, etc., to accomplish these tasks. As a data-base management system utilizing a file structure completely compatible with United Computing's host languages (FORTRAN, EDITOR, BASIC, etc.), IFM offers great flexibility in the design and development of information systems.

IFM is accessible in the time-sharing and remote job entry modes from the over 130 cities across the nation currently serviced by UCS's UNINET communications system. IFM is also available nationally via IN WATS communication facilities in the Remote Batch model.

## Special Features

IFM was designed to be highly interactive and "talks" to the user freely. An extensive prompting capability allows a novice user, with little IFM experience, to use the product with confidence. Unlike many file or data-base management systems, IFM data files and description files are maintained separately. Data files may be created by direct entry into the system or by an executing program, while the description file is created in IFM. IFM can manage any BCD file, in either fixed-field or free-field format.



Company Name : UNITED COMPUTING SYSTEMS, INC.  
Headquarters Address : 2525 Washington Street, Kansas City, MO 64108

Product Name : INFORM  
Number of years commercially available : 6  
Date of last up-date or improvement : January, 1979  
Approximate number of current users : 1,500  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Allan Klein and George Vondrasek  
Telephone No.: (816) 221-9700

## General Description

INFORM is a data management tool which permits rapid solutions of business problems by using English phrased commands.

INFORM has been in the marketplace, performing hundreds of real applications within tight schedules and narrow budgets.

INFORM's success results directly from its simplicity, human-engineering, ongoing upgrading, extensive support, and reasonable pricing.

### INFORM's DATA MANAGEMENT TOOLS

- English commands which may use English clauses for: conditional execution; record & field selection & test; index & table selection; inter-database matched processing; output database writing; and conversational, keyed retrieval.
- Datatypes: Integer, real, alpha, rounded real, and dates
- Operators: standard math, logical, boolean, plus dates & alphas, table look-up, and pattern matching
- Conversational data & redefinition & definition
- SORT/MERGE/CONSOLIDATE commands
- Data input from terminal, file or database in fixed, binary or free format with extensive edit tools

### INFORM's REPORT PREPARING TOOLS

- Report writing language uses BASIC - like verbs; I/O is automatic. Features are: table look-ups; interfile matching with access to unmatched records; horizontal & vertical space & tab; automatic sums to 10 levels; branching & subroutines; automatic rounding; built-in or user coded functions; automatic paging and headings; interactive prompt and input; condition testing; test for change in next record; simultaneous output to terminal and print file; picture formats: insert commas, floating \$, ( ) for negatives, etc.

## Special Features

- FORTRAN SUPPORT - access to built-in and user coded functions, chaining, and support routines
- ANALYTICAL PACKAGE - sum, min, max, average, count, freq. dist, crosstab, univariate stats, multiple regression
- INDEXED RETRIEVAL - Inverted index, ranging index, bit index with logical combination
- CROSS USER NUMBER FACILITY - files and databases may be accessed in other user numbers
- BATCH OR INTERACTIVE - procedure files, arg. substitution, nesting, branching, testing, error control
- AVAILABILITY ON PDP/11: INFORM was released in the Fall 1976 for time-shared use or software sale on the larger Digital Equipment PDP/11's. The PDP/11 version has these additional features: alternate data structures for the same database and file or record level locks with multiple readers and writers.

Company Name : UNITED COMPUTING SYSTEMS, INC.

Headquarters Address : 2525 Washington, Kansas City, MO 64108

Product Name : SYSTEM 2000 (owned by MRI SYSTEMS)

Number of years commercially available : 5; on UCS

Date of last up-date or improvement : March, 1977 (V2.6)

Approximate number of current users : 100

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Allan Klein and Curt Beane

Telephone No.: (816) 221-9700

## General Description

This system, SYSTEM 2000, owned by MRI System Corporation, is available on APEX/SL, United Computing System's national data services network, and is on UCS's IBM System. The combination of SYSTEM 2000 capabilities with the extensive UCS communications network and huge central computing facility creates an information processing environment capable of satisfying the most advanced applications requirements. SYSTEM 2000 provides the basis for developing fast and efficient information processing systems of any magnitude tailored to the application and the user. UCS puts these capabilities at the user's fingertips. SYSTEM 2000 features include a report writer, a user-oriented language providing on-line access to nonprogrammers, and a procedural language interface for programmer use.

Using SYSTEM 2000, a generalized data-base management system, information applications can be designed, installed and operating in days or weeks rather than months or years. Fully programmed, it is flexible and responds quickly to changing information requirements.

Redundant files and nightmarish update procedures are replaced with a single, integrated data-base and orderly maintenance functions. Data-bases can be structured in a number of complex ways. Unusual information needs are satisfied immediately and can be performed by nonprogramming personnel. SYSTEM 2000 provides a variety of data manipulation and formatting techniques. It can function in both on-line and batch environments.

## Special Features

SYSTEM 2000's self-contained language and procedural capabilities make SYSTEM 2000 easy to use without extensive DP training.

SYSTEM 2000 increases the user's efficiency in designing and maintaining his data-base; the variety of design options available to the user lets him specifically tailor his file organization, storage techniques, reports, access and response characteristics to accomplish the job at hand.

To achieve processing efficiency and greater economy, SYSTEM 2000 offers inverted index processing.

The user is not restricted to the use of one or a few elements as access keys; the user may specify as many key elements as he desires.

Company Name : UNITED COMPUTING SYSTEMS, INC.

Headquarters Address : 2525 Washington, Kansas City, MO 64108

Product Name : TOTAL

Number of years commercially available : 2; on UCS

Date of last up-date or improvement : September, 1978

Approximate number of current users : 100

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Allan Klein and Curt Beane

Telephone No.: (816) 221-9700

## General Description

TOTAL, owned by CINCOM Systems, is available on APEX/SL, United Computing System's data services network. TOTAL provides a Data Base Definition Language (DBDL) to define a data base for TOTAL's organization and management. The Data Management Language (DML) provided by TOTAL is used to access and manipulate the data base. DML commands are issued in user programs through subroutine CALL statements, and include such functions as opening and closing a data base, accessing and manipulation of data sets, serial processing of data sets, and data record logging.

TOTAL provides data independence from program changes, as well as program independence, and may be used in both batch and time-sharing environments. Used in conjunction with United Computing Systems extensive communication network and central computing facility, TOTAL is capable of satisfying the most advanced applications requirements.

## Special Features

A TOTAL data base consists of master and variable data sets. A master data set is accessed through a key field, and may be stand-alone or linked to one or more variable files. TOTAL maintains all linkages internally, so that the integrity of the data base is guaranteed.

The host program may be written in either FORTRAN or COBOL.

Only those data sets required by an application need to be referenced by the user program, so that one physical data base can appear as many logical data bases.

TOTAL provides both hierarchical and network structures.

Company Name : UNIVERSITY COMPUTING COMPANY

Headquarters Address : 1930 HI Line Drive, Dallas, TX 75207

Product Name : DBIV

Number of years commercially available : 3½

Date of last up-date or improvement : January, 1979

Approximate number of current users : 45

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Michael E. Smith

Telephone No.: (214) 655-8879

## General Description

Historically, data management systems have operated on the inverted file, hierarchic or network structures. All of these suffer from several major, intolerable draw-backs: (1) fixed design for implementation; (2) inflexibility for expansion; (3) pointer driven systems with heavy I/O penalties; (4) pre-defined relationships are required.

DBIV is designed around the "relational" concept inherently eliminating the above inflexibilities. The user doesn't worry about structure, position, or pre-designed, programmed, checked out and put into production in only days. Non-specialist programmers can produce useful systems with little or no direction from skilled database programmers.

All applications can access a common database without the penalty of extra accesses or additional structure storage. Database reorganizations are not necessary to maintain efficient access with DBIV.

Not having to define or refine any relationship within your data makes it faster, easier and more cost effective to use DBIV to design a database.

The separation of structure space from the required data space provides final record retrieval at one access per record rather than chasing endless linkage paths to trace tree structures. There is no system degradation because of updates. DBIV offers complete program and data independence which means no recoding is required to cater to new record layouts.

DBIV is a general purpose data management system offering all levels of data handling, retrieval, updating and reporting techniques via a variety of service functions. DBIV is available on the UCC computing system.

## Special Features

DBIV features a high level report generator, procedural language interface (COBOL, FORTRAN, Assembler Language) as well as a DATA LANGUAGE, a full query capability, automatic availability of all natural hierarchies and networks as specified at object time and teleprocessing capabilities under the control of external executive systems.

DBIV is available for both remote batch and conversational processing.



Company Name : WARNER COMPUTER SYSTEMS, INC.

Headquarters Address : 605 Third Avenue, New York, NY 10016

Product Name : WISE

Number of years commercially available : One (1)

Date of last up-date or improvement : September, 1978

Approximate number of current users : 10

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Naresh Rewari

Telephone No.: (212) 697-0110

### General Description

WISE is a flexible, general-purpose information retrieval package designed primarily for management. It enables the user to develop a database for any aspect of his organization and to manipulate this database in a wide variety of ways. WISE uses simple, conversational commands, so a user with no knowledge of computers or programming can learn the package after only a few days of instruction.

WISE's internal data structure permits the inclusion of variable-length records and repeating group fields, giving users great flexibility and minimizing storage requirements. Items in the data base may be sorted, selected, summarized, or transformed by computations. The package is equipped with simple statistical functions that can be applied to any numerical field.

WISE generates individually designed reports which may include page numbers, page headings and footings, column headings, totals, and any values that can be calculated from existing values in the database.

WISE databases are automatically scrambled; the master user can limit access to certain users within his organization.

Altering the structure of data in WISE is quite easy. New fields can be added and existing ones changed with simple commands. Data can be updated record by record, or a group of records may be changed with a single command.

WISE is intended primarily for use interactively, in time-sharing mode, but batch jobs may be set up to retrieve data and produce reports.

### Special Features

- User can specify fixed or variable-length records
- Repeating group fields used to minimize storage requirements
- Significant calculations may be performed on field values
- Simple statistics can be produced for values in any numeric field
- Security assured through encryption and user-specified passwords; user can extend security to individual fields in the database
- Data may be updated record by record, or all records may be changed with a single command





## INTERACTIVE STATISTICAL PACKAGES

American Management Systems, Inc.	
SPSS, SCSS, MLAB .....	III.020
<b>Boeing Computer Services Company*</b>	
STAT/BASIC .....	III.060
STATPK .....	III.061
STATPACK2 .....	III.062
<b>Calldata Systems, Inc.</b>	
AFSTAT .....	III.080
SPSS .....	III.081
STATPACK2 .....	III.082
UTILITY-CODER® .....	III.083
<b>Comshare, Incorporated</b>	
SAMPLE .....	III.100
TACTICS .....	III.101
<b>Data Resources, Inc.</b>	
EPS .....	III.120
<b>Informatics Inc., Data Services Div.</b>	
AFSTAT .....	III.140
SPSS .....	III.141
<b>Insko Systems Corporation</b>	
APL/STAT .....	III.160
SOUPAC .....	III.161
STAT/BASIC .....	III.162
<b>Interactive Market Systems, Inc.</b>	
AID-ONLINE .....	III.180
<b>I.P. Sharp Associates Limited</b>	
STATISTICAL ANALYSIS LIBRARIES .....	III.200
McDonnell Douglas Automation Co.	
SAS .....	III.220

<b>Metrocom Inc.</b>	
BMD .....	III.240
STATLIB .....	III.241
X11-S.A.M. ....	III.242
<b>National Computer Network of Chicago</b>	
IDA .....	III.260
<b>On-Line Systems, Inc.</b>	
OLSSAS .....	III.280
PRC Computer Center, Inc.	
BMD, BMD-P, SSP, TPL .....	III.300
SAS .....	III.301
SCSS .....	III.302
<b>Rapidata, Inc.</b>	
PROBE .....	III.320
Remote Computing Corporation	
TSP .....	III.340
Service Bureau Company, The	
DATAPACK .....	III.360
RISKAN II .....	III.361
TIMEPACK II .....	III.362
<b>Scientific Time Sharing Corporation</b>	
STATPAK .....	III.380
SPSS, Inc.	
SCSS .....	III.390
<b>Time Sharing Resources, Inc.</b>	
EML .....	III.400
Tymshare, Inc.	
EXPRESS .....	III.410
<b>United Computing Systems, Inc.</b>	
SPSS .....	III.420
<b>Warner Computer Systems, Inc.</b>	
STATPACK .....	III.440

\*Companies shown in **bold print** are Corporate Associate Members of ATSU.



Company Name : **AMERICAN MANAGEMENT SYSTEMS, INC.**

Headquarters Address : **1515 Wilson Boulevard, Arlington, VA 22209**

Product Name : **SPSS, SCSS, MLAB**

Number of years commercially available : **1, 1, 6**

Date of last up-date or improvement : **n.a.**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Jack Thomas**

Telephone No.: **(703) 841-6274**

### General Description

**AMShare**, American Management Systems' DECSYSTEM-20 timesharing, offers the **SPSS**, **SCSS** and **MLAB** statistical packages.

**SPSS** and **SCSS** are proprietary packages from **SPSS, Inc.** They offer a full range of statistical facilities for business and research. Capabilities include: Frequency distribution, n-way crosstabulation, correlation, analysis of variance, and regression analysis, among others.

**MLAB** is the statistical package developed at the National Institutes of Health. It facilitates the construction and evaluation of mathematical models. **MLAB** uses curve-fitting techniques that perform a wide range of mathematical operations through the specification of parameters.

**AMShare** provides statistical packages with output facilities for microfilm/microfiche (COM) and an input/output interface to American Management Systems' dual IBM 370.

### Special Features

In addition to COM output and interfacing files from **AMShare's** DECSYSTEM-20 to a dual IBM 370 system, these packages are characterized by:

#### **MLAB**

- automatic data retention
- system prompts & guidance
- 3-dimensional graphic facilities
- full range of trigonometric functions
- matrix capabilities

#### **SPSS & SCSS**

- compatible file structure
- inverted file facilities
- master file protection
- free format input



Company Name : **BOEING COMPUTER SERVICES COMPANY**

Headquarters Address : **177 Madison Avenue, Morristown, NJ 07960**

Product Name : **STAT/BASIC**

Number of years commercially available : **5**

Date of last up-date or improvement : **April, 1976**

Approximate number of current users : **Available to all MAINSTREAM-CTS users**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **James E. Hiebert**

Telephone No.: **(703) 821-6076**

### General Description

The STAT/BASIC package consists of 40 programs written in the BASIC computer language. These programs cover the following statistical functions:

- Data Generation: read, print, edit, transformation.
- Elementary Statistics: cross-tabulation, histogram, tally, moments, t-test, chi-square.
- Regression and Correlation: correlation, simple regression, stepwise regression, multiple regression, polynomial regression.
- Multivariate Analysis: discriminant analysis, canonical correlation, factor analysis.
- Design Analysis: analysis of variance, factorial design.
- Non parametric Statistics: Kendall rank correlation, sign test, Wilcoxin's matched-pairs signed-ranks test, Cochran Q test, Friedman two-way analysis of variance, Mann-Whitney U test, Kendall coefficient of concordance, biserial correlation, point-biserial correlation, tetrachoric correlation, phi coefficient.
- Time Series Analysis: moving average, seasonal analysis, cyclical analysis, autocovariance and autocorrelation, cross-variance and cross-correlation, triple exponential smoothing.
- Biostatistics: survival rate, probit analysis.

STAT/BASIC is an IBM Program Product.

### Special Features

The STAT/BASIC program guides the user in entering problem parameters and variables, and also provides guidance at certain key decision points during the analyses.

In addition, instructional messages are provided that allow new or occasional users of STAT/BASIC to respond to data requests without having to refer to the STAT/BASIC manual for guidance.

The program performs extensive error checking for input parameters and data, making it easy to correct errors during the data entry process.

Once data is entered into a disk storage file, the user can select and apply any of the appropriate analyses contained in the package to complete the desired calculations.



Company Name : BOEING COMPUTER SERVICES COMPANY  
Headquarters Address : 177 Madison Avenue, Morristown, NJ 07960

Product Name : STATPK  
Number of years commercially available : 6  
Date of last up-date or improvement : September, 1976  
Approximate number of current users : Available to all MAINSTREAM-CTS users  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : James E. Hiebert  
Telephone No.: (703) 821-6076

### General Description

This Statistical Package provides an easy way to perform the calculations required for most small-and medium-size statistical problems. The package contains over 20 individual data processing and statistical routines, each designed to perform a function needed to satisfy the requirements of a specific statistical problem in a conversational manner. The user has the option of using one or more of the specific routines as required to satisfy his particular needs. As a result, the user may prescribe the sequence of operations and the amount and type of output and may select alternate methods of calculations. Functions performed by STATPK include:

Transformation	— log, square root, etc.
Correlation	— product moment correlation coefficient
Cross tabulation	— frequency table for two crossed variables
Scatter diagram	— scatter plot for two
Histogram	— frequency bar chart for one variable
Line plot	— vertical line plot for several variables
Rank correlation	— Kendall rank correlation
Chi-square	— chi-square for a contingency table
T test	— two sample means
Regression	— simple regression, one independent variable
Stepwise regression	— select variables in order of importance
Multiple regression	— linear multidimensional regression
Polynomial regression	— regression using polynomials
Analysis of variance	— factorial design
Canonical correlation	— principal component and varimax rotation
Discriminant analysis	— multiple groups discriminant functions
Exponential smoothing	— triple exponential
Probit analysis	— probit regression and chi-square

### Special Features

This package provides editing capabilities to add, replace, and delete rows of elements of the data matrix and to save the data in a disk file.

Although a thorough understanding of the specific functions is recommended, the effective use of STATPK does not require an understanding of programming techniques. Through its conversational mode, STATPK elicits the proper response from the user. The user may often obtain additional information from the program by replying "SOS" to a question he does not understand. The program then lists options available to the user and details the meaning of each option.



Company Name : BOEING COMPUTER SERVICES COMPANY

Headquarters Address : 177 Madison Avenue, Morristown, NJ 07960

Product Name : STATPACK2

Number of years commercially available : 3.5

Date of last up-date or improvement : March, 1975

Approximate number of current users : Available to all MAINSTREAM-APL users

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : James E. Hiebert

Telephone No.: (703) 821-6076

## General Description

STATPACK2 is a collection of APL programs designed to solve many frequently used calculations in statistical analysis and mathematical programming. Some topics addressed by the programs include:

**DESCRIPTIVE STATISTICS** - Normal fit, 1- and 2-day frequency tables, mean, variance and standard deviation, median and quartiles.

**PROBABILITY DISTRIBUTION** - Binomial probabilities, Poisson probabilities.

**REGRESSION AND CORRELATION** - Simple regression, simple correlation, residual statistics stepwise regression and simple correlation matrix.

**ANALYSIS OF VARIANCE** - Complete factorial design, crossed or nested design, and one-way classification.

**MATRIX OPERATIONS** - Pivot Gauss-Jordan inverse and Gauss-Jordan inverse.

**OPERATIONS RESEARCH** - Conversational linear programming, linear programming, and Ford-Fulkerson algorithms.

STATPACK2 is an interactive APL statistical package development by the University of Alberta, Edmonton, Alberta, Canada.

## Special Features

A significant feature of APL is the ease with which APL library functions can be used with user-defined functions or with other APL library functions. Without requiring any declarations, APL processes all numeric data with the same syntax regardless of how that data is stored internally. This makes it easy to use the output from one function as input to a second function. For example, the data from a statistical routine in STATPACK2 can be fed directly to the plot function when appropriate.



Company Name : CALldata SYSTEMS, INC.

Headquarters Address : 20 Crossways Park N., Woodbury, NY 11797

Product Name : AFSTAT

Number of years commercially available : 2

Date of last up-date or improvement : March, 1978

Approximate number of current users : n.a.

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use : AMDAHL 470V/5

Headquarters contact : Aron Prochko

Telephone No.: (516) 575-6558

## General Description

AFSTAT is a generalized statistical program with an emphasis on the analysis and forecasting of time series. Using Box-Jenkins techniques, AFSTAT automatically performs model generation from the user-supplied historical data.

AFSTAT provides:

GENERAL STATISTICAL ANALYSIS in linear regression modeling and estimation.

TIME-SERIES FORECASTING of single or multi-variate series using the auto-regressive (AR), Integrated (I) moving average (MA) or ARIMA technique.

The exact nature of the ARIMA components are specified in the model by the orders and the values of the parameters. AFSTAT supports the following model types: AR(p), MA(q), ARMA(p,q) and ARIMA(p,d,q). The choice of a particular model is based primarily on the value of the autocorrelation function and the model residuals.

The AFSTAT procedure is performed in four phases:

1. Identification - defines the tentative model of linear functions from the historical data.
2. Estimation - adjusts the parameters by autoregressive differencing and moving average in the tentative model previously determined.
3. Diagnostic checking - the adequacy of the model is determined by autocorrelation of the residuals computed from the fitted models in the estimation phase.
4. Forecasting phase - AFSTAT automatically displays optimal future observations (forecasts) for any specified number of periods.

## Special Features

- AFSTAT is internally documented to aid the terminal user.
- Automatic or user-controlled identification, estimation and diagnostic analysis in best model selection.
- The best model is dynamically saved for future use.
- User can specify multiple origins for the forecast.
- User can specify a confidence level in the model for an uncertainty factor.



Company Name : CALldata SYSTEMS, INC.  
Headquarters Address : 20 Crossways Park N., Woodbury, NY 11797

Product Name : SPSS  
Number of years commercially available : New Product  
Date of last up-date or improvement :  
Approximate number of current users : n.a.  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : DEC-10  
Headquarters contact : David Grynberg Telephone No.: (516) 575-7881

### General Description

SPSS\*, Statistical Package for the Social Sciences, is an interactive system of computer programs which perform many different types of Market Research, Social Science and Demographic data analysis in a precise manner.

SPSS allows for free format input, and prints output in an easy to interpret form.

Widely used SPSS capabilities are:

- Simple and Multiple Regression Analysis including Regression through origin.
- Correlation and Partial Correlation Analysis.
- Histogram and Scatter diagrams.
- Descriptive statistics and one way frequency distribution.
- Cross tabulation and contingency tables.
- Breakdown and T-Test.
- Multiple Classification Analysis.
- Non Parametric Statistics.
- Scalogram including Guttman Scale.
- Canonical Correlation.
- Factor Analysis including QUARTIMAX, VARIMAX, EQUIMAX, and OBLIQUE rotation.
- Discriminant Analysis including stepwise.
- Reliability Analysis.

\*A product of SPSS, Inc.

### Special Features

Company Name : **CALLDATA SYSTEMS, INC.**

Headquarters Address : **20 Crossways Park N., Woodbury, NY 11797**

Product Name : **STATPACK2**

Number of years commercially available : **5**

Date of last up-date or improvement : **March, 1975**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **:**

Type(s) of equipment compatible for in-house use : **AMDAHL 470V/5**

Headquarters contact : **Aron Prochko**

Telephone No.: **(516) 575-6558**

## General Description

**STATPACK2** is a collection of APL programs useful in statistical analysis and operations research.

**STATPACK2** provides APL functions for:

**DESCRIPTIVE STATISTICS** - Mean, variance, standard deviation, median, quantity, plotting, 1&2 way frequency tables and normal fit.

**PROBABILITY DISTRIBUTIONS** - Binomial and Poisson probabilities.

**REGRESSION AND CORRELATION** - Simple, stepwise and multiple regression; residual analysis and statistics, simple and partial correlation.

**ANALYSIS OF VARIANCE** - Factorial Designs: complete, cross, nested, cross-nested and one-way classification.

**MATRIX OPERATIONS** - Pivot Gauss-Jordan Inverse, Gauss-Jordan Inverse.

**OPERATIONS RESEARCH** - Networking with CPM; Ford-Fulkerson algorithm; linear programming.

**MISCELLANEOUS** - Contingency tables, sorting, smoothing and permeating.

## Special Features

**STATPACK2** is completely self-documented to assist the user at the terminal. Workspaces for each function are available to explain how to use the function as well as its capabilities.

Data generated from one function can easily be used in other **STATPACK2** or user functions since it is self-contained in the APL system.



Company Name : CALldata SYSTEMS, INC.  
Headquarters Address : 20 Crossways Park N., Woodbury, NY 11797

Product Name : UTILITY-CODER®  
Number of years commercially available : 10  
Date of last up-date or improvement : July, 1977  
Approximate number of current users : n.a.  
Purchase price if available on in-house equipment :  
Type(s) of equipment compatible for in-house use : AMDAHL 470V/5  
Headquarters contact : Aron Prochko

Telephone No.: (516) 575-6558

### General Description

UTILITY-CODER\* provides a data entry language for non-programmers at all levels of proficiency. It can be used to program any type of data manipulation and many types of utility functions. Applications-oriented users perform such data-manipulation functions as data validation and recording, data retrieval, and report preparation. Systems-oriented users perform such utility functions as merging files, copying tapes, producing hexadecimal dumps, and installation/maintenance tasks. Users of advanced programs often invoke Utility-Coder in conjunction with another language or processor to sort data, and to load, examine and delete programs.

\*A product of Cambridge Computer Associates.

### Special Features

With UTILITY-CODER you can:

- Create and maintain data sets on any medium
- Retrieve subsets of data that satisfy tests of any complexity
- Generate printed reports or machine-readable summaries in any format
- Transcribe data from one medium to another
- Revise fixed or variable record formats
- Convert data from one representation to another (character, packed, binary hexadecimal)
- Generate test data for program checkout
- Edit re-code and summarize the contents of raw data file

Company Name : COMSHARE, INCORPORATED

Headquarters Address : 3001 South State Street, Ann Arbor, MI 48104

Product Name : SAMPLE

Number of years commercially available : 2

Date of last up-date or improvement : February, 1978

Approximate number of current users : 85

Purchase price if available on in-house  
equipment : n.a.Type(s) of equipment compatible for  
in-house use : n.a.

Headquarters contact : Compass Services

Telephone No.: (313) 994-4800

### General Description

SAMPLE was derived from the AICPA Volume 6 library of statistical sampling programs that are available to all CPAs. Using these programs COMSHARE has developed this system, which has the following capabilities:

- Random number generation
- Attributes sampling
- Discovery sampling
- Unstratified variable estimation techniques for — mean-per-unit, ratio, difference

Stratified variable estimation techniques are also available on COMSHARE using programs contained in the statistics section of the AICPA/COMSHARE library of time-sharing programs. These programs are contributed by CPA firms who have developed them over the years. There are over 100 programs in the library altogether, 25 of which are statistical in nature.

### Special Features

The random number generator features three major options:

- RANDOM DAYS for selecting calendar days from a selected period
- RANDOM LINES for selecting line numbers from a book or series of books
- RANDOM RANGES for selecting numbers from a range or series of ranges

The attributes and discovery methods provide the following features:

- Ability to establish confidence levels and precision traits for the population, allowing the system to compute the optimal sample size.
- Ability to measure the number of errors against the original criteria.

Company Name : COMSHARE, INCORPORATED  
Headquarters Address : 3001 South State Street, Ann Arbor, MI 48104

Product Name : TACTICS  
Number of years commercially available : 4  
Date of last up-date or improvement : Continuous  
Approximate number of current users : 200  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Larry Kerber  
Telephone No.: (313) 994-4800

### General Description

TACTICS is a statistical system that recognizes categorical data. This provides TACTICS with a variety of unique features that aid the user in performing a wide range of classical and modern analyses. Categorical data includes information on sex, product, state, etc. as opposed to analytical data such as temperature, weight, and time. By recognizing this difference, TACTICS allows the user to partition his data into, for example, groups of men and women, and perform parallel analyses on the analytical and categorical data for each group.

TACTICS includes extensive facilities for regression, n-way analysis of variance, crosstabulation, factor analysis, and cluster analysis, as well as the basic statistics. These techniques are complemented by commands which provide graphs, histograms, data transformation, data screening and I/O.

TACTICS users have entered over 100,000 commands with a success rate of 85%, indicating that the English syntax is intuitive and easy to use. Statistical output is translated to English wherever possible. An inverted data structure plus the storage of most categorical data as bytes provide TACTICS with inexpensive data access and storage. Data selection and data partitioning are particularly inexpensive.

### Special Features

- Full FORTRAN expression capability for data transformation
- Dynamic data partitioning based on expressions
- Parallel analysis capability for some or all defined partitions
- Survey data validation and extensive multipunched data capabilities
- Multiple classification regression, using categorical data
- Precise confidence levels provided for all statistics, avoiding the need for tables





Company Name : DATA RESOURCES, INCORPORATED

Headquarters Address : 29 Hartwell Avenue, Lexington, MA 02173

Product Name : EPS

Number of years commercially available : 2

Date of last up-date or improvement : EPS is expanding on a continuing basis.

Approximate number of current users : 2000

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Robert W. West, Ferris Taylor

Telephone No.: (617) 861-0165

### General Description

EPS is an interactive computer program developed exclusively by Data Resources, Inc. to help economic analysts in all phases and aspects of their quantitative work. The analyst communicates his needs to EPS through a remote terminal in short, English-like commands. In a matter of seconds after each command, EPS responds with the requested printout.

Through EPS, users have at their fingertips the vast selection of information in DRI's data banks. In addition, they can build and maintain their own data bases. Through EPS, they can use the extensive forecasts prepared by DRI, from the key forecasts of DRI's macro models to the satellite forecasts for particular industries, regions, and so forth. Using EPS, they can develop their own forecasts as well.

The analytical power of EPS extends from simple calculations like ratios and means, through standard procedures like ordinary least squares regressions, to advanced techniques like autoregressive moving-average analysis. Users can build econometric models ranging from one equation up to complex recursive and simultaneous systems containing thousands of equations. For reporting their results, they can set up reusable formats to display data and descriptions in virtually any arrangement. They can produce annotated graphs and charts, either on their own terminals or on DRI's central machinery.

In addition to standard linear regression, including polynomial distributed lags and correction for auto-regression, EPS offers two-stage least squares, ridge regression, autoregressive moving-average analysis, and nonlinear estimation.

Functions provide standard statistics such as mean, median, standard deviation, and coefficients of correlation. Functions are also used to evaluate and/or sample from F, t, normal, binomial, exponential, Poisson, geometric, normal, chi-square, and gamma distributions.

### Special Features

#### INTEGRATED LANGUAGE

All the capabilities of EPS — data management, statistical analysis, modeling, report-writing, graphics, etc. — are linked together in a single language according to consistent rules and patterns. The analyst can focus attention on the economic problem at hand, drawing freely upon EPS capabilities as the investigation proceeds.

#### PROGRAMMING LANGUAGE

As the analyst becomes experienced with EPS, he can package frequently used sequences of commands, so that they can be re-run on new sets of data. For those users who wish to organize their EPS processing into repeatable procedures, EPS is a full-fledged programming language.

Company Name : **INFORMATICS INC., DATA SERVICES DIVISION**

Headquarters Address : **6 Kingsbridge Road, Fairfield, NJ 07006**

Product Name : **AFSTAT**

Number of years commercially available : **2**

Date of last up-date or improvement : **October 1, 1978**

Approximate number of current users : **30**

Purchase price if available on in-house equipment : **License fee \$12,000 per year: (minimum license period - 2 years)**

Type(s) of equipment compatible for in-house use : **IBM/370; DEC-10**

Headquarters contact : **James T. Guastavino**

Telephone No.: **(201) 575-9610**

## General Description

**AFSTAT is a comprehensive package for statistical analysis, forecasting and model building. It combines statistical analysis techniques with Box-Jenkins time series forecasting (ARIMA). Besides univariate Box-Jenkins, AFSTAT has multivariate or transfer function modelling capability. It can handle up to five input time series. It also has a large number of generalized statistical analysis routines for data analysis and forecasting. AFSTAT is totally interactive and, besides sophisticated forecasting techniques, has extremely straightforward command language which makes it an easy-to-use tool for any kind of statistical analysis and forecasting.**

**AFSTAT includes: Automatic (at user option) univariate and multivariate Box-Jenkins, automatic step down and forward multiple regression (with conditional option), ridge regression, non-parametric univariate and multivariate methods for correlation studies and analysis of variance models, regression models with either independent errors (classical OLS), first-order Markov process (Hildreth-Lu), generalized Box-Jenkins structure (form of transfer function model).**

**Generalized economic analytical tools include - Census Bureau XII (Monthly and Quarterly), index number generation, growth curve analysis including substitution analysis, principal components, spectral analysis.**

## Special Features

- Options for batch or interactive use
- Automatic univariate Box-Jenkins models including verification of all statistical assumptions
- Multi-input Box-Jenkins capability (Transfer Function Models)
- Graphics (scatter plots and histograms) are integrated into partial residual analysis and ridge regression
- Dynamic storage of data matrices and commands to delete, add, generate, and simulate additional columns or to edit and filter certain subsets prior to statistical analysis
- General linear model hypothesis testing enabling either regression, analysis of variance, or covariance models to be constructed, tested and used in a forecasting or control environment
- Dynamic utilization of regression coefficients to evaluate derivatives
- One-way and two-way cross tabulations

Company Name : **INFORMATICS INC., DATA SERVICES DIVISION**

Headquarters Address : **6 Kingsbridge Road, Fairfield, NJ 07006**

Product Name : **SPSS (Statistical Package for the Social Sciences)**

Number of years commercially available : **10**

Date of last up-date or improvement : **September, 1977**

Approximate number of current users : **1650 installations**

Purchase price if available on in-house equipment : **Perpetual Lic. Fee: Acad.—\$1000; Non-profit—\$5000**  
**Maint. Ren. Fee per/yr: Acad.—\$600; Non-profit—\$800; Comm.—\$2000**

Type(s) of equipment compatible for in-house use : **IBM 360, 370, AMDAHL 470, ITEL AS, BURROUGHS, CDC, DEC, HONEYWELL, UNIVAC, XEROX**

Headquarters contact : **James T. Guastavino**

Telephone No.: **(201)575-9610**

## General Description

**SPSS (Statistical Package for the Social Sciences)** is an integrated system of computer programs designed for the analysis of Social Science data. SPSS allows a great deal of flexibility in the format of data. The system provides a unified and comprehensive package that enables the user to perform many different types of data analysis in a simple and convenient manner.

In addition to the usual descriptive statistics and simple frequency distribution, SPSS contains procedures for:

- Contingency Tables — Cross Tabulation
- Bivariate Correlation Analysis
  - Pearson Correlation
  - Rank-order Correlation
  - Scatter Diagrams
- Partial Correlation
- Multiple Regression Analysis
- General Linear Models — Path Analysis
- Analysis of Variance and Covariance
- Discriminant Analysis
- Factor Analysis
- Canonical Correlation Analysis
- Scalogram Analysis
  - Guttman Scale
- T-Test

SPSS may be accessed as a 370 OS/VS2 remote batch processing service and as a VM/370 (CMS) time shared processing service.

## Special Features

SPSS provides the user with a comprehensive set of procedures for data transformation and file manipulation, and offers the researcher a large number of statistical routines commonly used in the Social Sciences.

The data management facilities can be used to modify a file of data permanently and can also be used in conjunction with any of the statistical procedures. These facilities enable the user to generate new variables which are mathematical and/or logical combinations of existing variables, to recode variables, and to sample, select, or weight specified cases. SPSS is easily accessible to users with no prior computer experience.



Company Name : INSCO SYSTEMS CORPORATION  
Headquarters Address : 3501 Route 66, Neptune, NJ 07753

Product Name : APL/STAT  
Number of years commercially available : 2  
Date of last up-date or improvement : n.a.  
Approximate number of current users : Available to all INSCO users  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : John M. Tym Telephone No.: (201)922-1100

### General Description

APL/STAT is a set of APL programs designed for commonly occurring situations associated with statistical analysis and linear programming. These include the following major areas:

- Descriptive Statistics
- Confidence Intervals
- Analysis of Variance
- Linear Regression Analysis
- Hypothesis Testing
- Reliability
- Quality Control
- Non-Linear Regression Analysis

APL/STAT also include several utility programs which perform the following functions:

- Calculates effective interest when the nominal interest is known.
- Calculates 6 economic factors relating interest and money.
- Calculates periodic payments based on the capital recovery factor.
- Calculates year end statistics useful in income tax figures.

### Special Features

APL/STAT can be used from any APL as well as non-APL terminal. No prior knowledge of APL is assumed or required for use of APL/STAT.

APL/STAT is an open-ended system. Should a user's requirements ever exceed the capacity of the system, the necessary additions can be readily incorporated. It is also a self-documenting system in that each program has a built-in capacity for describing itself, and the user may also have the system type-out various usage examples.

Company Name : **INSCO SYSTEMS CORPORATION**

Headquarters Address : **3501 Route 66, Neptune, NJ 07753**

Product Name : **SOUPAC**

Number of years commercially available : **3**

Date of last up-date or improvement : **June, 1976**

Approximate number of current users : **Available to all INSCO users**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **John M. Tym** Telephone No.: **(201)922-1100**

## General Description

**SOUPAC is a very generalized system oriented towards statistical analysis, econometrics, and mathematical programming. It contains in excess of 150 different statistical techniques, estimates, and functions covering the following major areas:**

- Data and Matrix Manipulations
- Basic Population Statistics
- Analysis of Variance
- Correlations and Regression
- Distribution Analysis
- Factor Analysis
- Econometrics
- Spectral Analysis
- Scale Analysis
- Probit Analysis
- Mathematical Programming
- Non-parametric
- Special Purpose

## Special Features

**SOUPAC is driven by a simple, and largely free form, parameter language.**

**It contains facilities for generation of automatic "CALCOMP" type calls to a computer plotter. The user can either route these plots to a remote INSCO plotter (Zeta Research), or pull them off on his own plotter.**

Company Name : **INSCO SYSTEMS CORPORATION**

Headquarters Address : **3501 Route 66, Neptune, NJ 07753**

Product Name : **STAT/BASIC**

Number of years commercially available : **4**

Date of last up-date or improvement : **June, 1976**

Approximate number of current users : **Available to all INSCO users**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **John M. Tym** Telephone No.: **(201)922-1100**

## General Description

**STAT/BASIC** is a set of 80 programs written in the VSBASIC language, and covering the following statistical functions:

- **Data Generation**—read, print, edit, transformation.
- **Regression and Correlation**—correlation, simple regression, stepwise regression, multiple regression, polynomial regression.
- **Multivariate Analysis**—discriminant analysis, canonical correlation, factor analysis-part 1, factor analysis-part 2.
- **Non-parametric Statistics**—Kendall rank correlation, sign test, Wilcoxon's matched-pairs signed-ranks test, Cochran Q test, Friedman two-way analysis of variance, Mann-Whitney U test, Kendall coefficient of concordance, biserial correlation, point-biserial correlation, phi coefficient, tetrachoric correlation.
- **Biostatistics**—survival rate, probit analysis.
- **Design Analysis**—one-way analysis of variance, factorial design.
- **Elementary Statistics**—cross tabulation, histogram, tally, t-test, moment, chi-square.
- **Time Series Analysis**—moving average, seasonal average, cyclical analysis, autocovariance and autocorrelation, crosscovariance and crosscorrelation, triple exponential smoothing.
- Before local modifications by INSCO, **STAT/BASIC** was an IBM Program Product.

## Special Features

**STAT/BASIC** assists the user during the entry of problem parameters and variables, and also at certain key decision points within an analysis. It has a built-in "HELP" function which saves the user valuable time. It also provides extensive error checking for input parameters and data, displaying easily understood messages which allow for fast and accurate error correction.



Company Name : **INTERACTIVE MARKET SYSTEMS, INCORPORATED**

Headquarters Address : **19 West 44th St., New York, NY 10036**

Product Name : **AID-ONLINE**

Number of years commercially available : **7**

Date of last up-date or improvement : **Continually being enhanced**

Approximate number of current users : **500**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Richard Makely, President**

Telephone No.: **(212) 869-8810**

## General Description

Running large numbers of cross-tabs to determine profiles of, let's say, "heavy users of domestic wines"? It's time consuming. And, because the process is a subjective one, it is often the target of much criticism.

AID (Automatic Interaction Detector)-ONLINE helps solve these problems, like an intelligent researcher with unlimited computer resources. Given "heavy users of domestic wines" (dependent variable) and a list of independent variables, including "family size, household income and volume of use of imported wines", AID-ONLINE finds the one best variable and its break (e.g., household income \$20,000+ vs. household income less than \$20,000) which best splits the target into two groups. Then, for each group, AID performs the same analysis, splitting each into two new groups. The final result is a "tree" with cells of "heavy" and "light" users.

AID-ONLINE is available from your terminal, or on a call-in basis, for any study stored on IMS. Run costs are remarkably low and the system is easy to use. Tree diagrams are available, as are the tabular summaries of the AID analysis.

The IMS systems process and analyze advertising and marketing data bases, either individually or in combination. These bases contain national, regional and local information, including demographic, media, and product data. The data bases with which IMS works include:

Arbitron TV  
Arbitron Radio  
Arms II  
Audits & Survey  
Axiom - TGI  
BAR-Network TV  
BAR Spot TV  
Belden Associates

Brand Tracking Studies  
Canadian Print Meas. Bur.  
Census  
Consumer Panel Data  
European Bus. Readers Study  
Middle Eastern Study  
Monroe Mendelsohn  
MRCA Textile Panel

Nielsen Station Index  
Nielsen TV Index  
NPA  
NRS-U.K.  
Palshaw Measurement  
J. D. Powers  
Purchase Influence  
ORC Youth

Polk  
RSL-Pan Europe  
SAMI  
Simmons-SMRB  
SRDS  
Starch Elite  
TGI U.K.  
TMI

## Special Features

Systems allow easy English language access to procedures and provides English language coding for major data-base information.

Offers integration of such disparate data-bases as BAR and ARB, TGI and ARB, Purchase influence and W.R. Simmons.

Company Name : I.P. SHARP ASSOCIATES LIMITED

Headquarters Address : 145 King Street West, Toronto, Ontario M5H 1J8

Product Name : STATISTICAL ANALYSIS LIBRARIES

Number of years commercially available : 5

Date of last up-date or improvement : September, 1978

Approximate number of current users : 300

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact : Rosanne Wild Telephone No.: (416)364-5361

## General Description

The SHARP STATISTICAL ANALYSIS LIBRARIES are a collection of more than twenty workspaces covering areas of statistics useful in analysis of experiments and data reduction, time series analysis and modelling. There are 5 groups: descriptive, parametric, and non-parametric statistics, statistical tests; model parameter estimation; probability functions and distributions, sample generation; analysis of variance; time series analysis.

The libraries exhibit several characteristics of convenience to users. A combination of program modularity, a trend toward clear separation of input/output routines from calculation routines which do no input/output, and conditioning of calculation routines through state-setting functions provides for flexible uniform interfacing to a variety of environments: calculator mode, where the emphasis is on exploratory and one-time use; defined functions mode, where the statistical routines must integrate easily into a user system; in situations where inexperienced users must be led conversationally through the process; or situations where experienced users want quick answers. Output is produced in a clean readable manner suitable for incorporation into reports. Uniform documentation conventions are in force.

## Special Features

Some of self contained programs include: crosstabulation, contingency tables, chi-square, phi coefficient, Cramer's statistics, Fischer exact, Goodman Kruskal gamma. Descriptive statistics, histograms and n-tiles, binomial, Poisson, normal distribution, moving averages, rounding, permutations and combinations. Binomial tests, Kendall coefficient, Cox-Stewart test, ANOVA crossed and/or nested (any number of levels or factors and unequal subclass numbers). Latin square designs, blocked or random, missing values and replications. Profiles of factors for N-factor experiments. 1 and 2 tailed t Test, correlation matrices and simple or partial coefficients and covariance. Non-linear multivariate estimation (including Gompertz) using Marquardt technique. PDL and Shiller lag analysis, probit analysis on quantal data. Multivariate linear regression, stepwise regression, 2SLS, Hildreth-Lu method, confidence intervals. Ranked sign test, the following distribution generators: Cauchy, exponential, type 1 extreme value, Laplace, logistic normal, uniform, beta, binomial, chi-squared, F-distribution (central and non-central). Analysis of orthogonal factorial experiments. Principal component analysis, Box-Jenkins analysis and forecasting.

Reference: Statistical Functions in Sharp APL. 350 pages.

Company Name : MCDONNELL DOUGLAS AUTOMATION COMPANY (MCAUTO)

Headquarters Address : P.O. Box 516, St. Louis, MO 63166

Product Name : SAS

Number of years commercially available : 3

Date of last up-date or improvement : October, 1978

Approximate number of current users : 250

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : C. F. Meyer

Telephone No.: (314) 232-8181

### General Description

SAS is an integrated data management, statistical analysis and report-writer system designed for the non-programmer to effectively store, retrieve, and manage his data, perform simple or sophisticated statistical analyses and output comprehensive reports.

SAS runs under IBM OS/MVS TSO or RJE.

SAS consists of a simplified command or program language that is powerful and flexible. It enables the user to easily describe his data to SAS, perform the desired procedures, and report the results.

### Special Features

- SAS uses free-format input, is capable of acceptable data in almost any form. Can read variable length records.
- Interfaces with BMD, IBM OS utilities, user programs.
- Capable of having many data sets open at once.
- Capable of variable line sizes, multiple writes to the same line.
- Extensive plotting facilities, including MCAUTO VIVIDATA.
- Contains a generalized and sophisticated matrix procedure.
- Data management is easy, especially sorting, merging, concatenating, and interleaving data sets.



Company Name : METROCOM INC.

Headquarters Address : 1500 Southern Nat'l Center, 200 S. College St., Charlotte, NC 28202

Product Name : BMD — Biomedical Computer Programs

Number of years commercially available : 6

Date of last up-date or improvement : January, 1973

Approximate number of current users : 20

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Tarokh Taefi

Telephone No.: (704)374-1990

## General Description

The BIOMEDICAL Mathematics and Statistics package encompasses a series of 53 individual programs and was developed by the U.C.L.A. Medical Center with the following objectives:

- to provide a means of satisfying the task of commonly required statistical analysis of large amounts of data by utilizing data processing;
- to provide the programs in "package" form so that research workers may effect their desired computations with simple coded instructions;
- to provide the programs in a general form so that a wide variety of problems may be handled by each program by specifying appropriate parameters.

## Special Features

The programs are arranged and documented into the following six classes for ease and flexibility of use:

- Description and Tabulation
- Multivariate Analysis
- Regression Analysis
- Special Programs - (Life Table and Survival Rates, Contingency Tables, Probit Analysis and Transgeneration)
- Time Series Analysis
- Variance Analysis

The package can be accessed on-line via time sharing or remote batch usage.



Company Name : METROCOM INC.  
Headquarters Address : 1500 Southern Nat'l Center, 200 S. College St., Charlotte, NC 28202

Product Name : STATLIB  
Number of years commercially available : 7  
Date of last up-date or improvement : October, 1977  
Approximate number of current users : 100  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Tarokh Taeft  
Telephone No.: (704)374-1990

### General Description

STATLIB is a sub-catalog of general usage statistical routines which are written in either FORTRAN or BASIC. The catalog consists of 78 programs in the following areas:

- Variance Analysis - one-way, two-way, three-way, or multiple
- Regression Analysis - least squares (linear, exponential, and power functions), multiple linear (with transformations) stepwise
- Means, Deviations, Confidence Limits
- Others - such as Random Number Generators, Probability Distributions, and Correlation Analysis

### Special Features

All of the routines are stored in source version in a customer accessible library. This allows the user to make any modifications to the routines in order to utilize only the portions he needs or to bind the routine as a part of his own program. Moreover, the routines can be executed individually or in certain groups which correspond to the same data.



Company Name : **METROCOM INC.**

Headquarters Address : **1500 Southern Nat'l Center, 200 S. College St., Charlotte, NC 28202**

Product Name : **X11-S.A.M.**

Number of years commercially available : **5**

Date of last up-date or improvement : **July, 1977**

Approximate number of current users : **20**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Tarokh Taefi**

Telephone No.: **(704)374-1990**

### **General Description**

The "X-11 Variant of the Census Method II Seasonal Adjustment Program" is the standard computational program at the Bureau of the Census. In October, 1965 it was made available to other users. This was the first commercially available program to make possible the application of the ratio-to-moving average method.

### **Special Features**

X-11 S.A.M. provides flexibility to the time-series analyst in allowing him to select optional features peculiar to his own needs. For example, he may choose between the additive and multiplicative versions of between the full seasonal-adjustment routine and one limited to calculations of summary measures computed from other sources.





Company Name : **NATIONAL COMPUTER NETWORK OF CHICAGO**

Headquarters Address : **1929 North Harlem Avenue, Chicago, IL 60635**

Product Name : **IDA**  
Number of years commercially available : **1**  
Date of last up-date or improvement : **September, 1978**  
Approximate number of current users : **Confidential**  
Purchase price if available on in-house equipment : **n.a.**  
Type(s) of equipment compatible for in-house use : **n.a.**  
Headquarters contact : **Len Bole**

Telephone No.: **(312) 622-6666**

### **General Description**

IDA - Interactive Data Analysis...a conversational data analysis system is now up and running on NCN's DEC System 20. Designed with a high priority on user convenience, the system is internally documented and provides different levels of prompts and explanations corresponding to the user's familiarity with the system. Using a command structure based on four-letter mnemonics, both the novice and the professional can easily handle large statistical applications.

The data matrix used is normally dimensioned to a maximum of 500 observations for 19 variables. However, the system is flexible enough to be re-dimensioned to accommodate as many as 49 variables or 4000 observations. Data manipulation features include the ability to add, delete, or change observations or variables, and perform standard column transformations, including lag, difference, and exponential operations. The entire matrix or sub-matrix may be saved as a disk file.

The package contains a flexible set of commands for regression analysis. For simple or multiple regression, the ordinary least squares method can be used. For selecting independent variables, a step-wise procedure is available, and also forward and backward selection procedures and a powerful sweep operation. IDA retains all current regression results and will provide correlation coefficients, summary statistics, fitted values and residuals for the user's analysis. There are many methods for examining these residuals, including scatter plots of residual versus fitted values, plots for the sequence of residuals, and the Durbin-Watson statistic. Users may initiate model adequacy checks by performing normal probability plots, sequence plots, and other graphical displays.

Also included in the package are forecasting procedures, utilizing time series analysis, auto-correlation, serial correlation, and Box-Jenkins estimation. For tabular analysis, cross tabs, mean tables, and relative frequency tables are available.

### **Special Features**

- Interactive Commands
- Box-Jenkins Forecasting
- Time Series Analysis
- Data Display (Printing & Plotting)
- Data Transformations
- Durbin-Watson Forecasting
- Multiple Regression
- Cross Tabulations
- Analysis of Variance and Covariance
- Regression Analysis
- Correlation Analysis
- Histogram & Scattergram Plots
- Stepwise Regression



Company Name : **ON-LINE SYSTEMS, INC.**

Headquarters Address : **115 Evergreen Heights Drive, Pittsburgh, PA 15229**

Product Name : **OLSSAS (On-Line Systems' Statistical Analysis System)**

Number of years commercially available : **5**

Date of last up-date or improvement : **November, 1976**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Claude E. Stanley**

Telephone No.: **(412) 931-7600**

### General Description

OLSSAS is a time series analysis and forecasting system designed to serve both the casual user and the professional statistician. Built upon an English-oriented language, OLSSAS capabilities include:

#### EXECUTIVE LEVEL

- Command files
- Execute and return from user's programs
- Intra-line command editor

#### DATA FILES

- Direct data entry and edit
- Codeword access security
- Seq. access - Interface user program's data
- Random access - time series data bases

#### TREND ANALYSIS & FORECASTS

- Seven standard polynomial and transcendental curves
- Centered and leading moving averages
- Single/triple exponential smoothing
- Direct data display/storage
- Immediate refit options

#### DATA SERIES

- Internal data entry and edit
- Tabular and plot displays
- Mathematical transforms

#### DESCRIPTIVE STATISTICS

- Mean
- Std. development
- Histograms
- Scatter diagrams
- Correlation matrices
- Hypothesis tests

#### LINEAR REGRESSION

- Multiple
- Stepwise
- Residual analysis
- Correlational analysis
- Forecasting
- Tabular and plot display
- Core and file data storage

### Special Features

#### EXECUTIVE LEVEL

- Run-Immediate command files
- Dimensionable work space
  - up to 99 data series
  - total of 10,000 data values
- Automatic core adjustments

#### COMPLEMENTARY OLS PRODUCTS

- OLSFMS Modeling and reporting
- OLSGDS Graphic displays
- OLIVER Data Base Mgmt. System
- PDQ Box-Jenkins time series analysis

#### ANALYSIS OF VARIANCE

- Ten simultaneous factors
- 250 levels on each factor
- Internal data entry/edit
- Core and file data storage

#### SEASONAL ADJUSTMENT X-11

- From 36 to 240 monthly obs.
- Tabular/plot data displays
- Complete tables and charts printed off-line
- Core and file data storage
- Seasonal and deseasonal forecasts



APPLICATIONS  
DIRECTORY

## Interactive Statistical Packages

III.300

Company Name : PRC COMPUTER CENTER, INC.

Headquarters Address : 7670 Old Springhouse Road, McLean, VA 22102

Product Name : BMD, BMD-P, SSP, TPL

Number of years commercially available :

Date of last up-date or improvement : n.a.

Approximate number of current users : n.a.

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact

: George A. Thompson, Jr., Vice President

Telephone No.: (703)893-4880

### General Description

The packages described below cannot be considered as totally interactive. However, they do provide in-depth statistical analysis capability.

**BMD & BMD-P (Biomedical Computer Programs)** - Provides a variety of statistical procedures — multivariate analysis, regression analysis, analysis of variance, time series analysis and more.

**SSP (Scientific Subroutine Package)** - Provide a variety of statistical subroutines (over 250) to solve frequently encountered engineering, industry and scientific problems.

**TPL (Table Processing Language)** - A system for producing multi-dimensional, formatted and labelled tables. Basic aggregates, functions and frequency counts may be produced as table entries.

### Special Features

These packages provide routines to solve many scientific and statistical problems. These packages are maintained by organizations other than PRC and are continually being enhanced to maintain state-of-the-art analysis capabilities.

Date: November, 1978

Submitted By: George A. Thompson, Jr., Vice President



Company Name : PRC COMPUTER CENTER, INC.  
Headquarters Address : 7670 Old Springhouse Road, McLean, VA 22102

Product Name : SAS  
Number of years commercially available : 3  
Date of last up-date or improvement : January 12, 1978  
Approximate number of current users : Confidential  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : George A. Thompson, Jr., Vice President Telephone No.: (703)893-4880

### General Description

SAS is a software system for data management, statistical analysis and report writing. It is designed to assist clients with the need to reformat, reduce, analyze or reorganize large amounts of data. Using SAS, users have at their disposal a wide range of statistical procedures, extensive data management tools, and comprehensive report-writing features. SAS will run in both Interactive, batch and autobatch modes.

### Special Features

**STATISTICS** - General linear models, non-linear regressions, matrix manipulation, econometrics

**DATA MANAGEMENT** - Hierarchical file, variable length record, multiple record types

**REPORT WRITING** - Formatted data listings, frequency and cross tabulation reports

**COMPUTER PERFORMANCE EVALUATION** - Analysis of System Management Facilities (SMF), analysis of data from hardware monitors



Company Name : PRC COMPUTER CENTER, INC.

Headquarters Address : 7670 Old Springhouse Road, McLean, VA 22102

Product Name : SCSS (SPSS Conversational Statistical System)

Number of years commercially available : 1

Date of last up-date or improvement : September, 1977

Approximate number of current users : Confidential

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : George A. Thompson, Jr.

Telephone No.: (703) 893-4880

## General Description

SCSS is a conversational statistical package which provides a variety of statistical analyses. It is simple to use since it references variables by name, permits a variety of data transformations and clearly labels output.

This version currently has five procedures:

**UNIVARIATE** - frequency counts and descriptive statistics. For discrete (integer) variables frequency counts may be printed with value labels, percentage of total and non-missing cases, and cumulative percent of non-missing cases. Only descriptive statistics are provided for continuous variables. Statistics calculated include mean, standard deviation, mode, median, skewness, kurtosis, standard error, variance, maximum, minimum, range and sum.

**CROSSTABS** - n-way contingency tables and measures of association. CROSSTABS also includes an analytic facility for categorical fitting.

**BREAKDOWN** - n-way mean breakdown tables and the calculation of eta. Values of independent variables may be temporarily collapsed together or omitted, dependent variables may be temporarily rescaled to any desired mean and standard deviation.

**CORRELATION** - Pearson product moment correlations and partial correlations. In addition to the correlations, significance, covariance, cross-product deviation, univariate means, standard deviations and variances may be requested.

**REGRESSION** - Ordinary least squares regression with true stepwise, forward inclusion, backward exclusion, forced entry and forced removal methods.

New features are being developed.

## Special Features

The user interactively creates his control program. Data can be entered via the terminal. The job execution is controlled through the terminal and the user can immediately examine his output on the terminal or route it to a high speed printer.

No knowledge of JCL is required. The user is not required to have much computing experience to take advantage of the power of SPSS. Standard SPSS is also available for client use. It has the following features:

- |   |                       |                         |
|---|-----------------------|-------------------------|
| • Descriptive Statistics                          | • Partial Correlation | • Conomical Correlation |
| • Frequency Distributions                         | • Means and Variances | • Factor Analysis       |
| • Cross Tabulations                               | • Multiple Regression | • Scattered Diagrams    |
| • Correlation For Both Ordinal and Inordinal Data | • Guttman Sealling    | • Descriminate Analysis |



Company Name : RAPIDATA, INC.

Headquarters Address : 20 New Dutch Lane, Fairfield, NJ 07006

Product Name : PROBE

Number of years commercially available : 6

Date of last up-date or improvement : Continuous

Approximate number of current users : 2,000

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Thomas Paparatto

Telephone No.: (201) 227-0035

### General Description

PROBE is an integrated system for information management and data analysis. Included in PROBE is a wide range of capabilities for forecasting, report preparation, graphics, and data management for both time series and cross-sectional data. PROBE's English sentence command structure makes it ideally suited for financial applications, sales analysis, econometric modeling, market planning functions, and ad hoc data selection and display. PROBE may be used for interactive data analysis or as a programming language for complex and repetitive applications. PROBE's major capabilities include:

**DATA BASE MANAGEMENT** - PROBE's data management capabilities range from interactive data entry through simple data files to complex tree-structured data bases of unlimited size. Unique data retrieval abilities allow the same data to be analyzed from several different points of view — time series or cross-sectional, with automatic consolidation capabilities for tree-structured data.

**ANALYSIS AND FORECASTING** - PROBE's analytical capabilities include seven types of regression, recursive or simultaneous model simulation, seasonal analysis, exponential and adaptive smoothing, Winter's Forecasting, Univariate Box Jenkins Forecasting and Rapidata's exclusive multivariate State Space Forecasting System.

**GRAPHICS** - PROBE provides a powerful range of easy-to-use facilities for preparing point, curve and bar graphs on standard terminals, user plotters and plotting terminals, and remote-access Rapidata plotters.

**REPORT PREPARATION** - PROBE provides both built-in facilities for preparing tabular reports and direct access to Rapidata's exclusive RAPIDTAB system for preparing more complex tabular reports.

**DATA MANIPULATION AND ARITHMETIC TRANSFORMATION** - PROBE contains fifteen routines for manipulating data including sorting, element extraction, interpolation, and data rotation. Included in PROBE are twenty-five built-in arithmetic functions such as moving average, standard deviation, partial and weighted sums, and differencing.

**PRODUCT INTEGRATION** - PROBE is totally integrated with RAPIDATA's financial modeling language, FISCAL and its data base management language, X2C.

### Special Features

- In addition to providing efficient and economical facilities for storing and analyzing user data, PROBE provides direct access to over 50,000 time series in a variety of economic, financial and market research data bases, allowing analyses to be based on a combination of internal and external data.
- PROBE's unique, dynamic working area structure ensures the most effective use of computer resources, regardless of the size of the analysis.
- PROBE treats all dated information with true calendar accuracy; this is particularly important for daily and weekly data, making it possible, for example, to differentiate between 7-day weeks ending Wednesday (e.g. banking data) from 5-day weeks ending Friday (e.g. stock market data).
- Rapidata provides full reference and tutorial documentation and training, plus customer service and statistical consulting at District Sales Offices nationwide and in London.





Company Name : REMOTE COMPUTING CORPORATION  
Headquarters Address : 1076 E. Meadow Circle, Palo Alto, CA 94303

Product Name : TSP  
Number of years commercially available : 2  
Date of last up-date or improvement : October, 1976  
Approximate number of current users : n.a.  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : Terminals with dial-up capability  
Headquarters contact : Phillip M. Lumish

Telephone No.: (800)645-3120

### General Description

TSP is a computer language for the statistical analysis of time series by ordinary least squares and two-stage least squares. It has been designed to carry out all the computational steps which occur routinely in econometric research.

### Special Features

- Arithmetic transformation
- Least squares
- Two-stage least squares
- Capital stock
- General matrix routines
- Seasonal adjustments
- Non-linear least squares
- Multivariate least squares
- Polynomial distributed lags
- Regressions with first order serially correlated covariance and correlation matrices normalization



Company Name : THE SERVICE BUREAU COMPANY

Headquarters Address : 500 West Putnam Avenue, Greenwich, CT 06830

Product Name : DATAPACK

Number of years commercially available : Over 7 years

Date of last up-date or improvement : March, 1978

Approximate number of current users : Over 300

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Contact your local SBC Time-sharing Office Telephone No.:

## General Description

DATAPACK is a data analysis, statistical analysis and data display package available on CALL/370 Time-sharing. DATAPACK contains a wide variety of functions ranging from the simplest statistical calculations to highly sophisticated data analysis that include the following:

- Plotting - histograms, frequency tables, scatter diagrams, etc.
- Display Charts - pie, bar
- Control Charts
- Elementary Statistics and Tests
- Confidence and Tolerance Limits
- Distribution Testing
- Data Comparison - parametric and non-parametric
- Analysis of Variance - one, two and three-way
- Correlation Analysis
- Regression - multiple, stepwise, polynomial, curvilinear
- Non-Linear Curve Fitting
- Miscellaneous Statistical Calculations - contingency tables, sampling plan evaluation, probability computations, random number generation, Scheffe' method, etc.

## Special Features

- Automatic significance testing.
- Unequal sample sizes allowed.
- Ability to create, test, print, sort and edit input data.
- Easy interaction via simple English language functions and operations.
- Compatibility with other SBC applications such as TIMEPACK II, PICTURE-PAC, RISKAN II, PROPHIT II, and MINI-MIS.



Company Name : THE SERVICE BUREAU COMPANY

Headquarters Address : 500 West Putnam Avenue, Greenwich, CT 06830

Product Name : RISKAN II

Number of years commercially available : 7 years

Date of last up-date or improvement : (Continuously Enhanced)

Approximate number of current users : 100

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Contact your local SBC Time-sharing Office Telephone No.:

### General Description

RISKAN II is a general purpose modeling package with particular emphasis on risk analysis and reliability analysis. Available on CALL/370 Time-sharing, RISKAN II allows the user to describe a mathematical model simply in terms of the interaction among specified input and output variables, with given probability distributions. He can then choose combinations of three operating modes and over 35 report types by issuing simple English language commands. The three operating modes available are:

**DETERMINISTIC MODE** - Compute output variables using constant values and distribution means or medians.

**SENSITIVITY MODE** - Perform sensitivity analysis by varying the input variables.

**SIMULATION MODE** - Perform Monte Carlo simulation on the entire model.

The user may select a variety of output reports on any variable, such as cumulative tables and plots, histograms, simple statistics, and other statistical analyses. The user may specify his own report formats if desired.

Results from RISKAN II may also be used as input to other products such as PROPHIT II, TIMEPACK II, DATAPACK or PICTURE-PAC.

### Special Features

- 27 Statistical distributions available, including Poisson, Weibull, Weibner, Pascal, "skewed normal" and user-defined.
- Up to 800 input variables, 200 output variables and 30 time periods.
- Correlation permitted between variables and between time periods.
- Automatic calculation of return-on-investment, present worth and payback period.
- No "programming" is necessary - the user only needs to specify his mathematical model.
- Attractive, "publishable" plots of any variable.
- Compatibility with other SBC products such as PICTURE-PAC, TIMEPACK II, PROPHIT II, MINI-MIS, and DATAPACK.



Company Name : THE SERVICE BUREAU COMPANY

Headquarters Address : 500 West Putnam Avenue, Greenwich, CT 06830

Product Name : TIMEPACK II

Number of years commercially available : Over 4 years

Date of last up-date or improvement : September, 1978 (Continuously Enhanced)

Approximate number of current users : 400

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Contact your local SBC Time-sharing Office Telephone No.:

### General Description

TIMEPACK II is a time series analysis and forecasting package that incorporates within a single system the complete spectrum of widely used methods for analyzing and predicting the behavior of time series. Available on CALL/370 Time-sharing, TIMEPACK II includes the following methods and techniques:

- Trend Projections
- Exponential Smoothing
- Moving Averages
- Seasonal Analysis (Including X11)
- Trading-Day Analysis
- Extreme Values Identification
- Two Stage Least Squares
- Multiple Regression
- Stepwise Regression
- Aimon Lead-Lag Regression
- Correlation Analysis
- Box-Jenkins (Univariate and Bivariate)
- Many other miscellaneous routines, analyses and utilities

The analytical and forecasting results produced from TIMEPACK II may be presented in a variety of formats such as tables, plots and charts and may be saved for use as input to other CALL/370 applications, such as PICTURE-PAC, DATAPACK, RISKAN II, MINI-MIS and PROPHIT II.

A comprehensive data management and data transformation capability is also part of the TIMEPACK system.

### Special Features

- Extensive data management and data transformation capabilities.
- Extensive display capabilities.
- Easy interaction within the package via the use of simple English language commands and subcommands.
- Provision of many options for the customization of operation and selection of techniques.
- The complete Census Bureau's X11 Seasonal Analysis routine.
- Box-Jenkins Transfer Function (Bivariate).
- User-defined trend projections.
- Compatibility with other SBC applications such as PICTURE-PAC, PROPHIT II, MINI-MIS, RISKAN II, and DATAPACK.

Company Name : **SCIENTIFIC TIME SHARING CORPORATION**

Headquarters Address : **7316 Wisconsin Ave., Bethesda, MD 20014**

Product Name : **STATPAK**

Number of years commercially available : **9**

Date of last up-date or improvement : **1978**

Approximate number of current users : **250**

Purchase price if available on in-house equipment : **Price Upon Request**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Allen J. Rose**

Telephone No.: **(914) 428-6910**

## General Description

APL is a natural language for the solution of statistical problems. Inherent in the language are most of the procedures which are usually explicitly provided in the form of subroutines or subfunctions in other time-sharing systems. Built-in language features include both matrix and vector addition, subtraction, and multiplication. A multitude of transformation operators are provided. Matrix inversion and solution of least square fits are likewise built-in features. Any of these features can be easily combined to provide traditional statistical functions. Here are a few examples:

```

      ▽ R+AVG X
[1]  A CALCULATES ORDINARY ARITHMETIC AVERAGE OF A VECTOR
[2]  R+ (+/X) ÷ p, X
      ▽
      ▽ R+SD X
[1]  A STANDARD DEVIATION, CORRECT FOR DF
[2]  R+ ((+/(X-AVG X)*2) ÷ 1+p, X)*0.5
      ▽
      ▽ R+X CORR Y
[1]  A PEARSON PRODUCT MOMENT CORRELATION COEFFICIENT
[2]  X+X-AVG X ◊ Y+Y-AVG Y A CENTER X AND Y ABOUT THEIR MEANS
[3]  R+ (+/X*Y) ÷ ((+/X*2)*+/Y*2)*0.5 A COMPLETE CORRELATION COEFFICIENT
      ▽
      ▽ R+RANGE X
[1]  A COMPUTES HI-LO OR RANGE OF DATA
[2]  R+ ((/X) - \ / X)
      ▽

```

## Special Features

Besides the ease of expression shown above, APL\*PLUS Service provides a rich, preprogrammed library of statistical routines, including:

- Regression
- Factor Analysis
- Multiple Correlation
- Statistical Distributions
- Non-Parametrics
- Step-Wise Progression
- Plotting and Formatting of Results



Company Name : SPSS, INC.

Headquarters Address : 444 North Michigan Ave., Suite 3300, Chicago, IL 60611

Product Name : SCSS

Number of years commercially available : 1

Date of last up-date or improvement : September, 1978

Approximate number of current users : 70 Installations

Purchase price if available on in-house equipment : License fees: \$4,000/year (\$1,500/year for tax-exempt, \$1,000/year academic)

Type(s) of equipment compatible for in-house use : IBM 360/370 with TSO or CMS; DECsystem 10 and 20; Burroughs 6700/7700

Headquarters contact : Wylle Crawford Telephone No.: (312) 329-2400

### General Description

SCSS is a fully-interactive, highly efficient interactive tabulation and statistical tool, which is ideally suited to the needs of a wide range of research and teaching applications. A conversation between the user and the system is established which can take several forms, depending on the user's familiarity with the system. Three styles of prompting are available, plus a complete set of helpful explanations for each of the questions that the system asks the user. The user familiar with the system may also escape the question-and-answer sequence entirely by pre-emptively specifying answers to the questions before they are asked. In this way, a complete set of results may be obtained from each user command.

The statistical procedures available in the current release include frequency distributions, n-way crosstabulations, descriptions of subpopulations (including means, sums, standard deviations, and variances); correlation; partial correlation; multiple linear regression with forward, backward, true stepwise, and direct solution methods; T-test; and factor analysis.

In addition to the statistical capabilities, SCSS allows the user to list attributes of data files and their variables, to create new variables, to revise or delete existing variables, and to accept commands from and transmit output to other online devices besides the user's interactive terminal. A complete file definition subsystem is included for data input, or data may be obtained from already existing system files built by the widely-used SPSS program, also distributed by SPSS, Inc. Files created by SCSS may also be read by the batch SPSS program, thus providing complete file communication between the systems.

### Special Features

Unlimited number of cases in the data files, subject only to the capacity of the computer on which SCSS runs.

Unlimited number of variables in the data files, subject only to the above restriction, except that certain statistical procedures will have limits to the number of variables which can be active at any given time, subject to the memory capacity of the computer on which SCSS runs.

Masterfile-workfile architecture which allows many users to work independently on the same raw data without interfering with each other, while at the same time saving offline storage space and protecting the original data against destruction by the user.

Inverted file structure, which ensures that costly input-output operations are kept to a minimum.



**Company Name** : TYMSHARE, INC.**Headquarters Address** : 20705 Valley Green Drive, Cupertino, California 95014

**Product Name** : EXPRESS  
**Number of years commercially available** : Three (3)  
**Date of last up-date or improvement** : Continuous  
**Approximate number of current users** : n.a.  
**Purchase price if available on in-house equipment** : n.a.  
**Type(s) of equipment compatible for in-house use** : n.a.  
**Headquarters contact** : Tom Abbott

**Telephone No.:** (408) 446-6000

### General Description

EXPRESS, available on the Tymshare TYMCOM-370, is a unique system developed by Management Decision Systems, Inc., Weston, Massachusetts, for on-line information analysis and display, providing the decision maker with a full repertoire of information analysis tools for problem solving. It is unique because it offers key capabilities typically found in assorted other computer systems and programs within a single, integrated, user-oriented environment. EXPRESS is used for a wide variety of applications including sales reporting, market research analysis, cost/budget analysis, demographic studies, lease analysis, and market promotion study. Whether the user requires mathematical computations, statistics, sophisticated forecasting techniques, exception reporting, or cross-tabulation, he can perform it in EXPRESS.

#### EXPRESS is:

- Easy to use. A user can begin work immediately in EXPRESS with a highly interactive subset of the commands.
- Able to handle large problems: EXPRESS can accommodate data bases significantly larger than any allowed by other interactive systems.
- Flexible. Each user can define his own reporting formats and analysis procedures and make them available through simple commands. New data can always be added, new commands can be defined, and changes can be made to existing user-defined procedures.

### Special Features

- Data base definition, creation, management, and expansion
- Extensive information display techniques including ad hoc table generation
- An exception reporting mechanism
- A complete formal report generator
- Extensive graphics capability, including support of most graphics terminals
- Direct mathematical manipulation without programming
- Statistical library
- Financial functions
- Interface to FORTRAN and BAL
- Access to NBER data base





Company Name : **WARNER COMPUTER SYSTEMS, INC.**

Headquarters Address : **605 Third Avenue, New York, NY 10016**

Product Name : **STATPACK**

Number of years commercially available : **7½**

Date of last up-date or improvement : **January, 1978**

Approximate number of current users : **200**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Al Bollinger**

Telephone No.: **(212)697-0110**

### **General Description**

**STATPACK** is a conversational package of most-used statistical routines, written in FORTRAN but easily accessible to users who know no programming. It provides the following kinds of analysis:

- Elementary statistics
- Data transformation
- Correlation
- Kendall rank correlation
- Scatter diagrams
- Point plotting
- Histograms
- Chi-square
- T-Test
- Cross tabulation
- Linear regression
- Stepwise regression
- Multiple regression
- Polynomial regression
- Exponential smoothing
- Analysis of variance
- Probit analysis
- Cononical correlation
- Factor analysis
- Discriminant analysis
- Special analysis

Also provided are simple and consistent data file management routines. Data may be input from disc files, from the terminal, or from user programs.

### **Special Features**

**STATPACK** is designed for easy use. It includes highly interactive data preparation and housekeeping programs. A special "SOS" feature is available to the user who isn't too sure how to answer a question that appears at the terminal. More experienced users can suppress some of the package's conversational features to streamline a session.





INTERACTIVE GRAPHICS PROGRAMS

Introduction to Interactive Graphics Systems ....IV.001

<b>ADP Network Service, Inc.*</b>	
CYPHERGRAPH .....	IV.020
GRAPHICS SUBROUTINES .....	IV.021
<b>Agile Corporation</b>	
AGILE SUPERPLOT .....	IV.040
<b>American Management Systems, Inc.</b>	
DISSPLA .....	IV.060
<b>Boeing Computer Services, Inc.</b>	
BIGS .....	IV.080
<b>Data Resources, Incorporated</b>	
EPS .....	IV.100
<b>Informatics, Inc.</b>	
DISSPLA .....	IV.120
GCS .....	IV.121
TELL-A-GRAF .....	IV.122
<b>Interactive Data Corporation</b>	
INTERACTIVE DATA GRAPHICS .....	IV.140
<b>I.P. Sharp Associates Limited</b>	
GRAPHICS & PLOTTING .....	IV.160
<b>Manufacturing Data Systems, Inc.</b>	
COMPACT II® NC .....	IV.180
<b>McDonnell Douglas Automation Company</b>	
FASTDRAW .....	IV.200
VIVIDATA .....	IV.201
<b>National CSS, Inc.</b>	
DISSPLA .....	IV.210
PLOT-10 .....	IV.211
TELL-A-GRAF .....	IV.212
<b>On-Line Systems, Inc.</b>	
OLSGDS .....	IV.220
<b>Rapidata, Inc.</b>	
GRAPHICS .....	IV.240
<b>Scientific Time Sharing Corporation</b>	
10 PLOT .....	IV.260
<b>Service Bureau Company, The</b>	
PICTURE-PAC .....	IV.280
<b>Sun Information Services Company</b>	
CRT 1800 .....	IV.300
DISSPLA .....	IV.301
TEKTRONIX GRAPHICS LIBRARY .....	IV.302
<b>Tektronix, Inc.</b>	
PLOT 10 EASY GRAPHING .....	IV.320
PLOT 10 INT. GRAPHICS LIBRARY .....	IV.321
PLOT 10 INT. GRAPHICS PCKG. ....	IV.322
<b>Time Sharing Resources, Inc.</b>	
GRAFIT .....	IV.340
<b>United Computing Systems, Inc.</b>	
DISSPLA/UNIGRAF .....	IV.360
<b>Warner Computer Systems Inc.</b>	
PLOT .....	IV.380
TEKDRAW .....	IV.381
<b>Zeta Research</b>	
GSP .....	IV.400
TYPSET .....	IV.401

\*Companies shown in **bold print** are Corporate Associate Members of AT&S.







## INTRODUCTION TO INTERACTIVE GRAPHICS SYSTEMS

By Bruce A. Phillips

Information Services Marketing Manager, Rapidata

Graphs provide one of the most effective methods available for illustrating a comparison, highlighting a trend or summarizing a situation. This is particularly true when large amounts of data are involved. The typical 50-page, computer-printed report can often obscure key information due to sheer volume, but summarizing the same data in an attractive set of graphs can communicate the same information much more effectively.

Preparing graphs is an ideal application for an interactive computer system, for a number of reasons:

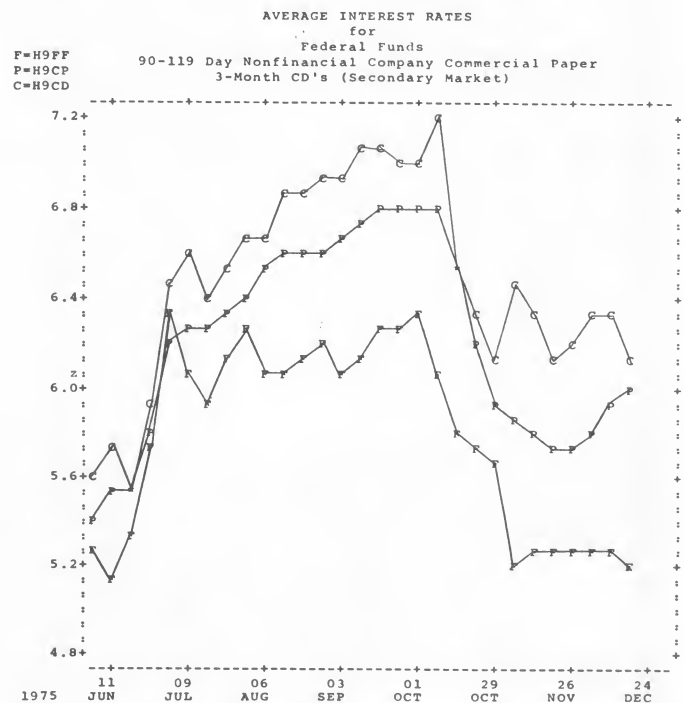
- The information to be displayed graphically is often already stored on a computer system for use in other applications, such as statistical or economic analysis, financial modeling, performance reporting, historical analysis and forecasting, or general data management, retrieval and reporting. On many systems, graphics capabilities are a part of, or easily accessible from, other applications packages.
- Many of the tasks involved in producing graphs are ideally suited to the capabilities of computers. Plotting tends to be a CPU-intensive application—scanning data to determine axis scaling, analyzing the data and desired graph text (titles, axis labels, etc.) relative to the desired size of the graph to determine the location of each part of the graph, “drawing” curves, bars and text, etc. Computers can perform these types of operations quickly, accurately and economically, particularly when the application calls for groups of similar graphs based on different sets of data.
- Graphs are often prepared repetitively. A typical graphic application might involve entering periodic updates for sets of data (the next month’s sales, the next quarter’s GNP) and then producing graphs of the updated data, such as a rolling 12-month sales performance analysis. The

data management systems now available on many systems, combined with built-in graphics capabilities, make this type of application extremely easy and straightforward.

## Capabilities

Graphics systems are available through many time-sharing vendors which prepare graphs on almost any type of terminal. In general, there are three types of terminals you should consider.

1. Non-plotting terminals. This category includes both standard time-sharing terminals and the high-speed line printers available through most



Source: Bank of America Money and Credit Statistics

systems. These "non-plotting" devices print only left to right and top to bottom. Graphs produced on these terminals are therefore generally limited to point plots and bar charts. Terminal plots provide an extremely useful enhancement for many applications. For example, if you are analyzing or forecasting a set of unknown data, there is no better way to get a "feel" for the data than to produce a quick plot. One look at such a graph will often highlight trends, seasonal patterns, and other data characteristics which will enable you to make more effective use of your analytical or forecasting system. Because no one else will see these graphs, the limitations imposed by the terminal are relatively unimportant. A straightforward, easy-to-use command language for producing these graphs provides a powerful analytical tool. The example on page 4 illustrates one of the many possibilities.

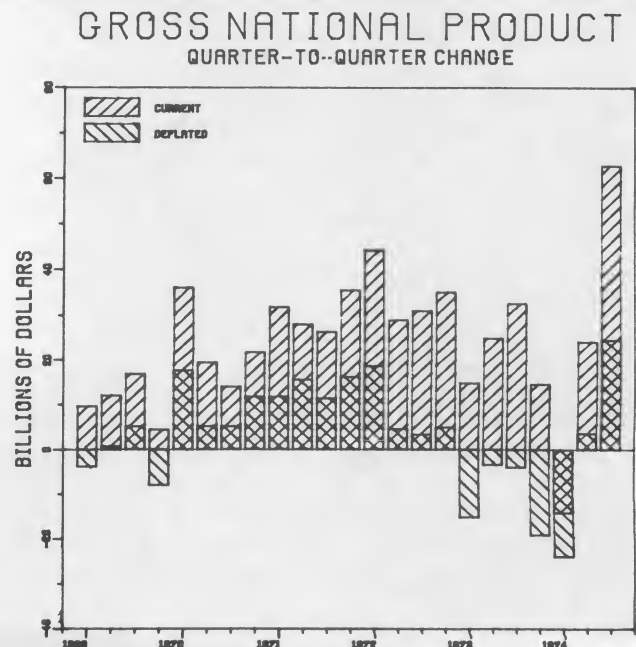
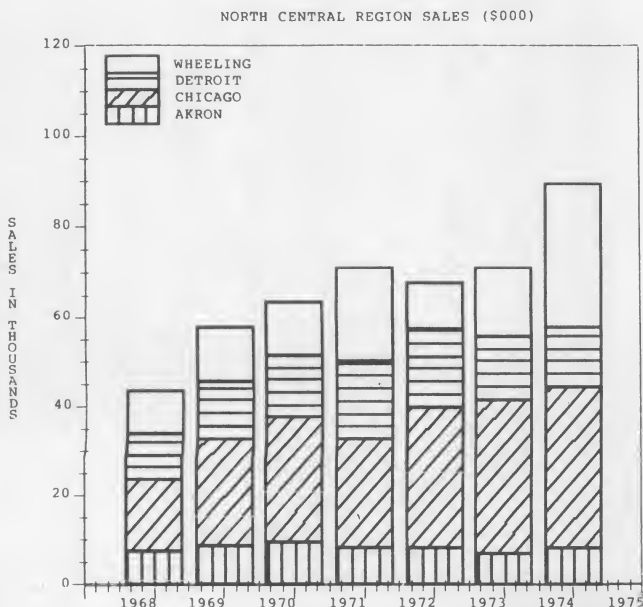
2. Plotting terminals. A wide variety of terminals have built-in enhancements which allow them to be used either as a standard time-sharing terminal or as a graphics device. In essence, the enhancements allow the terminal to print in any direction, vertically or horizontally. In addition to a variety of CRT terminals, there are a number of typing terminals which have this capability. Under certain configurations, high-speed printers can be operated this way, but generally only in batch or remote batch mode. Plotting terminals provide an ideal compromise for many users who prepare graphs periodically and in relatively low volume. Depending on the software package used to drive the terminal, an

extensive variety of attractive graphs can be produced—point, line and bar charts, pie charts, and many others. In many cases, graphs produced on this type of terminal can be directly enclosed in a report or other publication without further modification. The graph to the left below illustrates some of the capabilities of this type of terminal.

3. Plotters. For the "fanciest" graphs, such as those used as presentation flip charts, you should probably consider using a full-scale plotter. Many vendors offer remote access to such plotters, which are drum or flatbed pen plotters. In addition to essentially unlimited plotting capabilities, including multicolor and large-size graphs, these plotters and the software which drives them are ideally suited to high-volume graphics applications. For example, many companies, particularly the large utilities, produce periodic reports which take the form of books of graphs. While these graphs could be produced on a local plotting terminal, the volume makes it time-consuming and cumbersome. The graph to the right below illustrates how attractive graphs produced in this manner can be.

### Costs

For most applications, graphs prepared using an interactive system compare favorably in cost with those produced using other methods. The larger the volume, the better the comparison, since economies of scale are often possible on computerized systems which cannot be matched, for example, in a cor-



porate art department.

You should be able to produce almost any type of graph on a non-plotting terminal for under \$5.00, and for simple graphs used during an analysis, the cost can be as low as \$.50. Because the amount of processing required to produce a graph on a plotter or plotting terminal is higher than for a non-plotting terminal, costs will also be higher. Plotters will tend to be slightly more expensive than plotting terminals, because most plotters draw letters and digits, while most plotting terminals type them, thus requiring less processing. A simple line plot will typically cost \$1.00 to \$3.00 depending on the plotter. As the graph becomes more complex (more text, more attractive character sets, more variables or observations, more "decoration," such as bar shading), the cost will rise accordingly. A reasonably attractive graph will typically cost \$5.00 to \$10.00, but a large-size, multicolor graph with a large amount of decoration can cost \$30.00 to \$50.00 or more.

When considering costs, keep in mind that interactive graphics systems are primarily a means of making more effective use of people. Based on 50 40-hour weeks per year and an overhead rate (office space, insurance, fringes, etc.) of 25 per cent, a person's time costs \$6.25 per hour for every \$10,000 per year he or she earns. A great deal of the work involved in preparing a graph manually represents very poor use of people's time—drawing lines with rulers, locating points on a grid, etc. Therefore, when you decide to use an interactive graphics system, the money and improved morale you gain through better utilization of your people will often more than offset the computer-related costs of preparing graphs using the new method.

### Some Final Notes

Graphics is a classic timesharing application, since

most packages allow you to buy only as much computing as you need. For example, if you are involved in a forecasting application and wanted to get a quick look at the patterns in the data, you could prepare a 3 x 4 foot multicolor graph to do it, but the problem obviously does not justify the expenditure of time and money which would be required. For this type of problem, you would probably prefer an extremely easy to use system which can generate reasonably attractive terminal graphs at minimum cost.

On the other hand, if you are preparing for a presentation on which a \$1 million decision will be based, you want extremely attractive graphic flip charts which will really make an impact. Given the magnitude of the decision, a more expensive graph which requires more time to specify would be well worth the extra effort.

In deciding on an interactive system, you should first make a rough survey of your graphics requirements. Once you have a general idea of the types of graphs you will need, it becomes relatively easy to determine what type of terminal you need (if any). Ideally, the system you select should meet your needs, be well documented, and be easily accessible to the other package(s) you are using for your applications.

The user who would like to learn more about how graphs can be used to communicate more effectively would be well advised to consult a text on the subject. One good source is *Practical Charting Techniques*, by Mary Eleanor Spear (McGraw-Hill, 1969). Once you determine that graphs would be useful for your application, you can choose from a wide variety of interactive graphics systems which will assist you to prepare them accurately, effectively, and economically.





Company Name : **ADP NETWORK SERVICES, INC.**

Headquarters Address : **175 Jackson Plaza, Ann Arbor, MI 48106**

Product Name : **CYPHERGRAPH**

Number of years commercially available : **9**

Date of last up-date or improvement : **Continuous**

Approximate number of current users : **200**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **James B. Fischer** Telephone No.: **(313) 769-6800**

### **General Description**

CypherGraph is a high level graphics language that provides a fast and easy way to produce multicolor, presentation quality graphs on CalComp graphics equipment at ADP Network Services' Technical Centers and over 30 on-line graphics devices. Graphs are interactively created by answering a series of queries. In this process, a plot definition file is created which can be modified to customize the graph for any purpose. CypherGraph can create a single graph with up to 20 variables using curves, bars or histograms of different types, colors and shading with up to four linear calendar or logarithmic axes. As many as 50 separate graphs can be defined in each plot definition file. CypherGraph can be integrated into existing applications that use standard languages and is compatible with other ADP Network Services products.

### **Special Features**

- A device-independent design provides great flexibility
- Simple, straightforward conventions permit immediate productivity
- Graphs are easily customized to fit specific needs
- Response files and command files facilitate fully automatic production of graphic output



Company Name : **ADP NETWORK SERVICES, INC.**

Headquarters Address : **175 Jackson Plaza, Ann Arbor, MI 48106**

Product Name : **GRAPHICS SUBROUTINES**

Number of years commercially available : **9**

Date of last up-date or improvement : **Continuous**

Approximate number of current users : **200**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **James B. Fischer** Telephone No.: **(313) 769-6800**

### General Description

The Graphics Subroutines are a series of over 55 FORTRAN-callable subroutines that constitute the basic building blocks of ADP Network Services' device-independent graphics system. These subroutines permit interactive graphics programs to be designed and customized to fit any need. Graphics output is available on any of four CalComp plotters at ADP Network Services' Technical Centers and over 30 on-line graphics devices. The Graphics Subroutines provide maximum flexibility and the ability to use the special features of specific graphics devices to perform data input or output. Business, scientific and drafting subroutines are available, as are general subroutines to draw smooth curves, symbols, linear or logarithmic axes, dimension lines, shading of a polygon, perform windowing and much more.

### Special Features

- Device-independent graphics system
- Graphic data input facilities are available
- Over 55 subroutines are available
- Presentation-quality output
- Cost effective for large quantities





Company Name : AGILE CORPORATION

Headquarters Address : 1050 Stewart Drive, Sunnyvale, CA 94086

Product Name : AGILE SUPERPLOT

Number of years commercially available : 1

Date of last up-date or improvement : August 1, 1977

Approximate number of current users : 200

Purchase price if available on in-house equipment : \$100.00

Type(s) of equipment compatible for in-house use : Agile Model A-1

Headquarters contact : Nick Sackerson

Telephone No.: (408)735-9904

## General Description

Superplot is Agile's high-performance plot support package that turns the Agile terminal into a true plotter. Unlike other terminal plotting routines, which move the print element an increment at a time from one plot position to the next, Superplot uses single-character commands to move the print element up to fourteen increments at a time, horizontally, vertically, or both at once. While the printer is not as fast as a pen plotter, its ability to plot and print text at the same time results in very good throughput rates, as well as high-quality finished plots.

The Superplot package is a series of FORTRAN subroutines that can be called by the program that generates the data. Superplot translates the data into commands that control the terminal's plotting capabilities. Existing FORTRAN programs can be modified easily to include the plotting subroutines calls. Superplot subroutines are also available on many time-sharing systems.

Superplot is a source-code compatible with CalComp plotter software, so the Superplot subroutines can be integrated with existing programs that use the CalComp plotter without restructuring the program. The subroutines can be linked with other FORTRAN plotting programs with similar ease.

## Special Features

- Draws horizontal and vertical lines.
- Prints character strings at over 50 different angles.
- Converts a real variable to the appropriate fixed decimal equivalent and prints it in FORTRAN F-type format.
- Examines an array of data to determine true starting value and scaling factor to be used in a plot.
- Plots a line segment according to values found in two input arrays.
- Draws an axis with annotated tic marks and a centered title.



Company Name : AMERICAN MANAGEMENT SYSTEMS, INC.

Headquarters Address : 1515 Wilson Boulevard, Arlington, VA 22209

Product Name : DISSPLA, PLOT-10 and EASYGRAPH

Number of years commercially available : 2, 7 and 7

Date of last up-date or improvement : n.a.

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Jack Thomas

Telephone No.: (703)841-6274

### General Description

AMShare, American Management Systems' DECSYSTEM-20 timesharing, offers ISSCO's DISSPLA and Tektronix' PLOT-20 and EASYGRAPH packages.

These packages give you the capability for:

- 2 and 3 dimensional graphics
- computer output to microfilm/microfiche
- interactive or FORTRAN calls
- world, continent and state boundary mapping
- pie charts, histogram and bar charts
- variable viewing and axis scaling
- function or matrix defined surfaces
- linear or spherical coordinates
- cubic spline, least squares, step, bar and parametric cubic splines
- multiple graphs per page
- blanking and smoothing
- interface between DECSYSTEM-20 and IBM 370

### Special Features

In addition to providing output facilities for COM and an input/output interface to an IBM 370 system from the DECSYSTEM-20, AMShare features:

- interrupted grid lines and data curves
- curve interpolation
- 3-D projection with or without hidden lines
- business plotting routines
- 15 map projections and user defined projections
- high speed polygonal area blanking
- self-scaling
- automatic graphic typesetting
- user supplied transformation
- base transformation
- full user interaction

**Company Name** : **BOEING COMPUTER SERVICES COMPANY****Headquarters Address** : **177 Madison Avenue, Morristown, NJ 07960****Product Name** : **BIGS (BCS Interactive Graphics System)****Number of years commercially available** : **5****Date of last up-date or improvement** : **1977****Approximate number of current users** : **Many****Purchase price if available on in-house equipment** : **n.a.****Type(s) of equipment compatible for in-house use** : **n.a.****Headquarters contact** : **James E. Hiebert****Telephone No.:** **(703)821-6076****General Description**

**BIGS is a user oriented system that provides interactive users (on low-cost graphic display terminals) an easy, rapid method for making any existing or new FORTRAN program interactive with graphic display. BIGS automatically generates standard-type displays, such as grids, axes curves, menus, charts, and tables. These displays provide inter-activity with the terminal and require no user knowledge of the supporting software. Major capabilities include:**

- Easy conversion of existing FORTRAN programs to an interactive environment
- Graphic display of any geometric figure
- Editing of textual and numeric data
- Option selection
- Creation of hardcopy plots of any graphic display
- Graphic display of plotted and symbolic data

**Special Features**

**BCS provides experienced technical support in the use of the BIG Systems.**

**Company Name** : DATA RESOURCES, INCORPORATED**Headquarters Address** : 29 Hartwell Avenue, Lexington, MA 02173**Product Name** : EPS**Number of years commercially available** : 2**Date of last up-date or improvement** : on going**Approximate number of current users** : 2500**Purchase price if available on in-house equipment** : n.a.**Type(s) of equipment compatible for in-house use** : n.a.**Headquarters contact** : Brenda Kelly, Applications Consultant**Telephone No.:** (617)861-0165

### General Description

The Data Resources EPS Graphics service is an easy-to-use, on-line facility for displaying time-series data in graphic form. Series from the DRI data base, as well as the user's own proprietary data, can be extracted and presented in an organized, informative, and visually appealing manner. This user-oriented software service makes it quick, easy, and inexpensive to plot data series against time on a variety of pen-plotters and graphics terminals. Any number of plots can be constructed, reviewed, and revised quickly—interactively—at the user's own plotter.

The standard set of default conditions is designed to produce highly informative plots for data analysis in the quickest and least expensive format. A wide choice of options provides the control necessary to fine-tune plots for presentation-quality appearance. Commands to create complex or often-repeated plots can be stored in a routine for automatic re-execution. Extended programming facilities allow the user to update or modify a pre-prepared command sequence interactively. Data series to be plotted may be retrieved from any DRI-supported data banks or from private user data banks, and a wide range of transformations—including an extensive frequency-conversion capability—is available to use on those series.

### Special Features

- Multiple data series may be plotted on one graph.
- Multiple graphs may be drawn on one page.
- Scatter or line plots may use a variety of solid, dotted, or dashed lines.
- Bar charts may have a selection of bar widths and shadings.
- Axes may be automatically scaled and annotated.
- Titles and labels may be printed within the plot area, or above, below, and to the sides of graphs.



Company Name : **INFORMATICS INC. DATA SERVICES DIVISION**

Headquarters Address : **6 Kingsbridge Road, Fairfield, NJ 07006**

Product Name : **DISSPLA\***

Number of years commercially available : **4 months**

Date of last up-date or improvement : **August, 1978**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **David Aach**

Telephone No.: **(201) 575-9610**

### General Description

**DISSPLA** is the most widely used and generally accepted graphics software system. The package consists of a library of FORTRAN subroutines. Users code their own FORTRAN programs making calls to **DISSPLA** routines to draw titles, label axis, draw grids, etc. **DISSPLA** is independent of the plotting device upon which the graph is to be displayed.

**DISSPLA** is available on the Informatics CP/CMS time-sharing system and support is available for the following devices:

- **CALCOMP**
- **Tektronix**
- **Anderson Jacobsen**
- **Zeta Research**
- **Diablo HyTerm**

Any additional devices will be supported if the software is IBM compatible.

\***DISSPLA** is a registered trademark of Integrated Software Systems Corporation.

### Special Features

- **Greek, Russian, Gothic and Hebrew alphabets**
- **World map layouts and projections**
- **3-Dimension plotting**
- **Shading areas between curves**
- **Post processor for replotting without rerunning**

**Company Name** : **INFORMATICS INC. DATA SERVICES DIVISION****Headquarters Address** : **6 Kingsbridge Road, Fairfield, NJ 07006****Product Name** : **GCS (The Graphics Compatibility System)****Number of years commercially available** : **1****Date of last up-date or improvement** : **November, 1977****Approximate number of current users** : **n.a.****Purchase price if available on in-house equipment** : **n.a.****Type(s) of equipment compatible for in-house use** : **n.a.****Headquarters contact** : **David Aach****Telephone No.:** **(201) 575-9610**

### General Description

GCS is a collection of FORTRAN IV subroutines which provides a high-level, device-independent graphic capability. It was originally designed and implemented at the U.S. Military Academy at West Point, NY. It has been widely used in corporations, governments, and universities throughout the country.

At Informatics, GCS has been implemented on the IBM VM/370 Time Sharing system. The output or terminal devices listed below are supported:

- CALCOMP plotter
- Line printer
- Alphanumeric terminals
- Tektronics 4010/4012/4013 storage tube terminals
- Tektronics 4014/4015 storage tube terminals
- Diablo HyTerm 1610/1620 communication terminal

Additional devices can be supported upon request.

### Special Features

- Graphics display of any complex geometric figure
- Plotting array of data with automatic scaling
- Editing and displaying textual and numeric data
- Flexible coordinate systems and transformations
- User-control plotting in virtual or device mode

**Date:** **November, 1978****Submitted By:** **David Aach, Marketing Manager of System Products**





Company Name : **INFORMATICS INC. DATA SERVICES DIVISION**

Headquarters Address : **6 Kingsbridge Road, Fairfield, NJ 07006**

Product Name : **TELL-A-GRAF\***

Number of years commercially available : **4 months**

Date of last up-date or improvement : **August, 1978**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **David Aach**

Telephone No.: **(201) 575-9610**

### **General Description**

**TELL-A-GRAF is an interactive graphics package which understands English sentences and commands. The basic plots are bar charts, pie charts and curve plots. TELL-A-GRAF allows commands and input data to be stored in CMS files or entered conversationally. A TELL-A-GRAF profile can be set up to specify default plotting devices and other user preferred options.**

**The TELL-A-GRAF product can support the following devices at this time and additional IBM compatible devices will be supported in the future.**

- **CALCOMP**
- **Tektronix**
- **Anderson Jacobsen**
- **Zeta Research**
- **Diablo**

**\*TELL-A-GRAF is a proprietary software package of Integrated Software Systems Corporation.**

### **Special Features**

- **HELP Function**
- **Post processor**
- **Shaded areas between curves**
- **Russian, Greek, Gothic, Hebrew alphabets**



Company Name : INTERACTIVE DATA CORPORATION

Headquarters Address : 486 Totten Pond Road, Waltham, MA 02154

Product Name : INTERACTIVE DATA GRAPHICS

Number of years commercially available : 3

Date of last up-date or improvement : September, 1978

Approximate number of current users : 800

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Product Manager, Graphics

Telephone No.: (617) 890-1234

### General Description

Interactive Data Corporation offers three graphics systems designed for a variety of applications.

The XSIM® PLOT Facility is for the user who needs low-cost, high-quality graphs produced quickly and with a minimum of effort and expense.

The XSIM GRAPH Facility is for the user who needs more precise control over the format of the graphs and access to more advanced graphic capabilities.

The ES Graphics Facility is for users of FORTRAN, COBOL, and PL/I. It provides access to the Display Integrated Software System and Plotting Language (DISSPLA)®, a highly versatile system capable of producing almost any type of data display.

These graphic systems can be used with many different types of plotting devices including the 4-color 36-inch drum plotter at Interactive Data Corporation, or a drum or flatbed plotter, a CRT terminal, or a daisy wheel terminal in the user's office.

XSIM is a registered servicemark of Interactive Data Corporation.

DISSPLA is a registered trademark of Integrated Software Systems Corporation.

### Special Features

- MANY TYPES OF GRAPHS - Time plots using lines and bars, scatter diagrams, pie, histogram, 3-dimensional, maps.
- VARIETY OF AXIS SYSTEMS - Time axes, linear, logarithmic, polar, user-labeled.
- CURVE INTERPOLATION - Third- and fifth-order spline and least-squares smoothing.
- MULTIPLE TEXT CHOICES - User alphabets, titles, multiple headings, legends, 51 character sets in 8 lettering styles, annotations, centering, right- or left-justification, control of size, angle, and location, blanked areas.
- MULTIPLE GRAPHS AND TABLETS - Multiple graphs on one page, multiple pages per run, facilities to intermix graphs and text.
- MAP DRAWING FACILITY - World coastlines, national boundaries, U.S. state boundaries, user data, 16 user-defined projections.
- 3-DIMENSIONAL CAPABILITY - Linear and spherical coordinates, 3-D curves, hidden line removal, function or matrix defined surfaces, any viewpoint.



Company Name : I.P. SHARP ASSOCIATES LIMITED

Headquarters Address : 145 King Street West, Toronto, Ontario M5H 1J8

Product Name : **GRAPHICS and PLOTTING**

Number of years commercially available : **5**

Date of last up-date or improvement : **September, 1978**

Approximate number of current users : **150**

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact : **Rosanne Wlild** Telephone No.: **(416)364-5361**

### General Description

#### GRAPHICS

The SHARP APL Graphics package contains about 150 functions that can be used to construct interactive and non-interactive graphics applications in SHARP APL.

Graphic objects are represented and manipulated in familiar APL ways; sets of points (with or without connecting lines) are treated conceptually the way APL treats scalar values. There are functions that mimic the actions of APL primitives—on sets of points or collections of sets—for example, combining them into graphic vectors that are subject to concatenation, compression, and so on. A powerful graphic editor is available to generate and modify pictures.

The routines in the library are deliberately general in order to get a new system running quickly. Modifications to the system can therefore be made at the outset, and once the code has become fairly stable it can be specialized for more favorable running costs.

There is one terminal-dependent function and it is easily modified to drive a variety of terminals. The DTC300 and 302, the TEK4013 and 4015, DIABLO 1550 and 1620, AJ832, Trendata 4000 and the Houston Instruments Plotter, are presently supported. The system will also support TEK4013 and 4015 crosshair input, and input from TEK4953 Graphics tablet. The superplot or ultraplot feature must be present on those terminals that have that option, for the SHARP APL routines to work properly. Use of these terminals without superplot more than doubles the cost of producing graphics output.

#### PLOTTING

The Plot package is an easily used set of programs designed to present numeric results in a variety of graphic forms. It provides options regarding the types of graphs (either histograms or curves), number of functions to be plotted together, titling, scaling, printing of axes, plotting characteristics and destination of results.

### Special Features

For terminals capable of high resolution, the FINEPLOT options can be invoked.

The Graphics and Plotting packages offer many features which increase the users' productivity.

- A wide variety of terminals are supported.
- The programs are extremely general to aid quick development.
- There are many user elected options (or defaults) to increase control over output without programming.
- The Graphic and Plotting functions may be imbedded easily in user-written systems.



Company Name : **MANUFACTURING DATA SYSTEMS, INC.**

Headquarters Address : **4251 Plymouth Road, Ann Arbor, MI 48105**

Product Name : **COMPACT II® NC Graphics System**

Number of years commercially available : **10**

Date of last up-date or improvement : **August, 1977**

Approximate number of current users : **1,250**

Purchase price if available on in-house equipment : **Available on request**

Type(s) of equipment compatible for in-house use : **Hewlett-Packard, Tektronix**

Headquarters contact : **Richard J. Paull, Corporate Product Specialist** Telephone No.: **(313)995-6000**

### **General Description**

MDSI®'s NC graphics system reduces part programming time by providing the part programmer with a visual presentation of both part shape and cutter path. This on-line plotting capability includes isometric, Z-X and Y-Z plotting in addition to standard X-Y plotting. The low-cost plotting capability of COMPACT II® can also plot tooling, holding devices and other important information not directly related to tool motion.

### **Special Features**

- 4-view plot capability
- 4-color plots
- character plotting (Lettering)
- single command arc generation
- framing with front panel controls
- automatic dashed line generation
- build-in self-test diagnostics
- indication of tool motion



Company Name : MCDONNELL DOUGLAS AUTOMATION COMPANY (MCAUTO)

Headquarters Address : P.O. Box 516, St. Louis, MO 63166

Product Name : FASTDRAW

Number of years commercially available : 5

Date of last up-date or improvement : August 1, 1978

Approximate number of current users : 200

Purchase price if available on in-house equipment : \$70,000

Type(s) of equipment compatible for in-house use : IBM 370 Running MVS release 3.7 with TSO/TCAM

Headquarters contact : Jerry Folk

Telephone No.: (314)232-7268

### General Description

FASTDRAW is an interactive graphics program that aids the structural engineer prepare the geometry of a structural model.

It has three main capabilities:

FASTDRAW can read data in a form for input to the structural analysis programs (STRU DL, NASTRAN, ANSYS, SAPV, EASE2) and display it;

FASTDRAW can construct points and elements and store changes in the data file in the form required for analysis, and;

FASTDRAW can display plot files output by any of the MCAUTO analysis programs as well as user programs.

The FASTDRAW/2 model display features permit both 2D (in any plane) and 3D display from any view and scale of selected points and elements. Model editing features permit routine points and element construction and deletion as well as duplicating points and elements by translating, rotating, and scaling. FASTDRAW/2 can be leased for installation on MVS systems.

### Special Features

FASTDRAW/3, the latest version, includes all FASTDRAW/2 features and the ability to construct and display local coordinate systems and surfaces and to automatically place a mesh of points and elements on a surface. Extensive surface construction capabilities are available including all the common analytic surfaces as well as developable surfaces. FASTDRAW/3 also creates points at surface intersections. FASTDRAW/3 is available on MCAUTO's DAC-II time-sharing system at standard time-sharing rates.



Company Name : MCDONNELL DOUGLAS AUTOMATION COMPANY (MCAUTO)

Headquarters Address : P.O. Box 516, St. Louis, MO 63166

Product Name : VIVIDATA

Number of years commercially available : 1

Date of last up-date or improvement : September, 1978

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : IBM 370, CDC CYBER 175

Headquarters contact : Bob Baker

Telephone No.: (314)232-7268

### General Description

In today's automated world, the task of interpreting page after page of tabulated results can become the limiting factor in timely decisions. Graphic displays allow you to "break the data barrier" and get on with the decision process.

VIVIDATA is an integrated software library that enables a user easily and rapidly to produce graphic displays of his application data on either on-line graphics terminals or high quality pen and ink or electrostatic plotters. The software is designed to allow maximum versatility of design and format of the display while at the same time providing the comprehensiveness needed to satisfy many specialized needs without sophisticated programming skills.

Users access VIVIDATA through a program written by the user in a standard programming language such as FORTRAN, COBOL or PL1. This program will contain "calls" to VIVIDATA subprograms which perform the graphic tasks requested.

Simple, complete plots of data can be created with a single statement by means of the self-formatting plot subroutines. Axis systems may be linear, semilog, log-log, polar or polar-log, and the data may be displayed as a line graph, smoothed or fitted curve, histogram, pie chart or step plot. Split-screen plots and subplots nested to any level may be produced as easily as single plots. Reserved areas, where plotting is suppressed, and a gamut of text control capabilities including multiple font styles, upper and lower case, character height, width, skewing and rotation angle adjustment, combine to produce professional quality displays with a minimum of program statements.

### Special Features

VIVIDATA is device independent. Displays may be created on a variety of plotters or graphics terminals without source changes to the program.

Support of user-defined symbol tables is an integral part of VIVIDATA. VIVIDATA builds the tables for the user based on input data describing each character. Once created, the tables exist on an external medium such as disk and may be loaded for use by any number of programs. The number of user-defined symbol tables is unlimited.

For on-line graphics terminals, VIVIDATA fully supports graphics input and other terminal control features. Users may interactively select screen positions for placement of graphic items such as text, subplots, arrows, and so forth.





Company Name : **NATIONAL CSS, INC.**

Headquarters Address : **187 Danbury Road, Wilton, CT 06897**

Product Name : **DISSPLA**

Number of years commercially available : **Two (2)**

Date of last up-date or improvement : **January, 1979**

Approximate number of current users : **40**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Kate Kalin, Language Marketing** Telephone No.: **(203) 762-2511**

### **General Description**

DISSPLA is an extremely powerful, flexible graphics software system which is capable of virtually any type of data display. The package, a proprietary product of Integrated Software Systems Corporation (ISSCO), is device-independent and can be used with any type of plotter, hardcopy device, or line printer. Specific device interfaces are accomplished by one simple statement in a user routine.

DISSPLA, in its simplest form, can be used to create standard plots with minimal effort by using all the default options. By calling specific options to modify a plot, the user may attain any desired level of sophistication. DISSPLA is useful for all types of business, scientific, mathematical, or statistical graphics representation.

### **Special Features**

In addition to standard plotting package features, DISSPLA offers:

- Various axes systems and combinations
- 51 character sets in 8 styles
- Several interpolation and smoothing techniques
- Self-scaling routines
- Mapping capabilities; 15 map projections
- Business plotting routines
- 3-dimensional data display
- Transformations and projections

Date: **May, 1979**

Submitted By: **Kate Kalin, Manager - Language Products**



Company Name : NATIONAL CSS, INC.

Headquarters Address : 187 Danbury Road, Wilton, CT 06897

Product Name : PLOT-10

Number of years commercially available : Six (6)

Date of last up date or improvement : October, 1978

Approximate number of current users : 45

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Kate Kalin, Language Marketing

Telephone No.: (203) 762-2511

### General Description

PLOT-10, supplied by Tektronix, Inc., is a comprehensive graphics system which extends the capabilities of the Tektronix 4000-series terminals. The system consists of several distinct packages which can be used individually or concurrently to achieve the desired results. The two major packages of the PLOT-10 system are the Interactive Graphing Package and Advanced Graphing II. The PLOT-10/Interactive Graphing extends plotting capabilities to the non-programmer through structured English-language commands which construct, modify, and store graphs interactively. The PLOT-10/Advanced Graphing II consists of FORTRAN subroutines which perform extensive modifications to the 40 elements which make up a PLOT-10 graph.

### Special Features

PLOT-10/Interactive Graphing capabilities include:

- various curve, symbol styles
- multiple axes
- multiple graphs per page
- on-line editing
- storage and retrieval of plots

PLOT-10/Advanced Graphing II provides:

- logarithmic plots
- extensive labeling options
- windowing capability
- business graphing routines

Date: May, 1979

Submitted By: Kate Kalin, Manager - Language Products



Company Name : NATIONAL CSS, INC.

Headquarters Address : 187 Danbury Road, Wilton, CT 06897

Product Name : TELL-A-GRAF

Number of years commercially available : Two (2)

Date of last up-date or improvement : January, 1979

Approximate number of current users : 60

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Kate Kalin, Language Marketing

Telephone No.: (203) 762-2511

### General Description

TELL-A-GRAF\* is an interactive plotting design system which understands simple English commands and draws professional line plots, bar charts, pie charts and pages of text. Customized plots can be drawn quickly and easily by non-programmers or non-dp oriented users. Input data can be stored in a file or can be entered interactively.

TELL-A-GRAF is device-independent. It can presently be used on all of the major plotting hardware and will be updated as new devices are designed and marketed.

\*TELL-A-GRAF is a proprietary product of Integrated Software Systems Corporation and was designed on the National CSS VP/CSS Operating System.

### Special Features

- Automatic Layout
- Automatic Legend Identification
- Blanked Out Areas
- 57 Alphabets
- Automatic Data Scaling
- Multiple Plots on a Page
- Shaded Character Fonts

- Multi-color Plots
- Typeset, Centered, or Left-Justified text
- Interpolation and Smoothing
- Several Axis Types
- Regression Lines
- HELP Facility

Date: May, 1979

Submitted By: Kate Kalin, Manager - Language Products





Company Name : **ON-LINE SYSTEMS, INC.**

Headquarters Address : **115 Evergreen Heights Drive, Pittsburgh, PA 15229**

Product Name : **OLSGDS (On-Line Systems' Graph Design System)**

Number of years commercially available : **5**

Date of last up-date or improvement : **June, 1977**

Approximate number of current users :

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact : **Paul Y. H. Chu**

Telephone No.: **(412)931-7600**

### General Description

OLSGDS is a versatile, easy to use, integrated graph design and production system. By answering a few questions, OLSGDS will draw a graph to meet any need: bars, curves, lines, and symbols. Titles, data, and special notes are then added. With this information, OLSGDS chooses scales, formats titles, selects labels and proper grid — automatically.

#### OLSGDS features:

- **Graphic Templates** - OLSGDS provides the user with a library of graphic templates. These templates may be modified to meet specific requirements. In addition, the user can create a customized design.
- **Annotation Editor** - OLSGDS features a unique annotation editor. This editor allows the user to have "sketchpad" control over the design of the graph. This capability may be used to add special notes highlighting turning points in the data, to explain discontinuities and to build tables or legends. Features such as a corporate trademark may be added.
- **Flexibility** - OLSGDS can be used with many terminals. This includes both CRT and hard copy types of graphic and non-graphic terminals. Multi-color plots up to 34 inches wide can be produced on our high resolution plotters in Pittsburgh.

### Special Features

- OLSGDS is callable by your FORTRAN or COBOL program
- Compare up to 36 sets of data - use up to four different axes, each with its own scaling and up to nine lines of data
- Graphs may be stored in OLSGDS for immediate recall with new sets of data
- OLSGDS has an extensive "help system" to assist you in graph design modeling, statistics, and project management
- Easy to learn - OLSGDS was developed for use by non-programmers
- Choice of pen sizes
- Up to four colors



Company Name : **RAPIDATA, INC.**

Headquarters Address : **20 New Dutch Lane, Fairfield, NJ 07006**

Product Name : **GRAPHICS**

Number of years commercially available : **3**

Date of last up-date or improvement : **Continuous**

Approximate number of current users : **250**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Thomas Paparatto**

Telephone No.: **(201) 227-0035**

### General Description

Rapidata's Graphics capability provides an economical, easy to use method for preparing report-quality graphs on standard terminals, remote access Rapidata plotters and a growing variety of user plotters and plotting terminals. The Graphics system is designed for the user who needs to produce attractive graphs, but doesn't have the time to learn a computer language. Rapidata's Graphics system contains a set of built-in default assumptions about such characteristics as graph size and appearance, axis scaling, label size and location and display mode (curves, bars, etc.). To produce a plot, the user only enters a one-word command and the names of the variables to be graphed. A wide variety of plot options may be entered with the command, but if the default value for the option meets the user's requirements, the option is not required. For special applications, the user may specify that the default option values be permanently altered.

Graphs are frequently only part of a larger application. For this reason, Rapidata's Graphics capability is closely integrated with the exclusive PROBE system for data management, time series analysis and forecasting and report-preparation. This integration further simplifies the process of preparing graphs by providing automatic methods for such operations as labelling time axes and including variables of different periodicities (e.g. weekly and monthly) on the same graph with true calendar accuracy. In addition to time plots, Graphics can also produce scatter plots with equal ease.

Rapidata's Graphics capability provides a powerful, easy to use system for enhancing the effectiveness of reports and presentations by means of high quality graphic display of time series or cross-sectional data.

### Special Features

- High-quality graphs on standard terminals, remote-access Rapidata plotters and a growing variety of user plotting terminals.
- Specification of each graph using a single self-explanatory command, with multi-level defaults.
- A wide variety of display modes—symbols, connected symbols, curves, histograms, spikes, and stacked or overlaid bars.
- Data of different periodicities (daily, weekly, monthly, quarterly or annual) on the same graph.
- Single or multiple linear, semi-log, or logarithmic axes.
- Automatic or user-specified scaling for numeric axes, and automatic scaling of data axes with true calendar accuracy.
- User control of plot frames and grids.
- User-specifiable graph titles, footnotes, legends, and axis labels, using variable size and quality upper or lower case lettering and user-defined symbols.





Company Name : SCIENTIFIC TIME SHARING CORPORATION

Headquarters Address : 7316 Wisconsin Ave., Bethesda, MD 20014

Product Name : 10 PLOT

Number of years commercially available : 7

Date of last up-date or improvement : October, 1978

Approximate number of current users : 100

Purchase price if available on in-house equipment : Price Upon Request

Type(s) of equipment compatible for in-house use : Any APL system with workspace size 32K \*

Headquarters contact : Roy A. Sykes, Jr.

Telephone No.: (213) 347-1633

### General Description

10 PLOT is a self-contained interactive plotting program designed specifically for typewriter-oriented terminals. It plots points with a choice of automatic or user-set scaling, axes control and labelling, and plot size. It permits plotting of multiple variables, interchange of axes, and full control over plot characters.

\* (Includes IBM APL/360, APL-SV, VSAPL, 5100/5110, Burroughs APL/700, UNIVAC, CDC, DEC, H.P.)

### Special Features

Overstrike and high resolution (900 points per square inch) on terminals so equipped; histograms; linear or logarithmic scaling; fixed or floating axes; choice of output format (for subsequent processing in text editors, report generators, and user-written programs). Option control may be interactive or not.



Company Name : **THE SERVICE BUREAU COMPANY**

Headquarters Address : **500 West Putnam Avenue, Greenwich, CT 06830**

Product Name : **PICTURE-PAC**

Number of years commercially available : **3**

Date of last up-date or improvement : **Continuous**

Approximate number of current users : **Over 600**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Contact Local SBC Time-Sharing Office** Telephone No.:

### General Description

**PICTURE-PAC**, a powerful new system available only on CALL/370's Management Time-sharing Service, provides an easy way to produce practically any kind of business chart or graph. It combines flexibility, ease-of-use, and efficiency and makes it possible for business people with no knowledge of computers or programming to generate high quality business graphics right in their own office.

With **PICTURE-PAC** you can produce:

- Time Plots
- Scatter Diagrams
- Bar Charts
- Variance Bar Charts
- Pie Charts
- Histograms

Output from **PICTURE-PAC** may be obtained on ordinary time-sharing terminals, the same terminals used to type your reports. It especially takes advantage of the features of "Daisy Wheel" terminals, to obtain a variety of attractive effects including multicolor printing. Further, highly professional multicolor pen plots (either on paper or directly on overhead transparency projection material) may be obtained using penplotters. The pen-plotter capabilities uses the same easy-to-use **PICTURE-PAC** language, so no coding (nor use of FORTRAN sub-routines even) is necessary.

### Special Features

A convenient set of Data Transformation capabilities is also included. Single-line commands can transform one kind of data into another useful form for plotting. These may be named functions (e.g., Moving Average, Weighted Moving Average, Lead, Lag, Standard Deviation, Accumulate, etc.) or user-constructed arithmetic expressions.

**PICTURE-PAC** is highly compatible with the other systems in CALL/370's "Business Information Services for Planning, Analysis and Control" (BIS-PAC). These include: **MINI-MIS** (especially the new **MMX**) - for inquiry, reporting and data management; **RISKAN II** - for risk analysis; **STATPACK** and **DATAPACK** - for statistical analysis; **TIMEPACK II** - for a complete range of time-series analysis and forecasting tools, ranging from the most simple through sophisticated **X-11** and **Box Jenkins** techniques; and **PROPHIT II** - for planning, analysis, modeling and reporting.



Company Name : **SUN INFORMATION SERVICES COMPANY**

Headquarters Address : **680 E. Swedesford Road, Ste. 310, Wayne, PA 19087**

Product Name : **TEKTRONIX GRAPHICS LIBRARY**

Number of years commercially available : **11**

Date of last up-date or improvement : **September, 1977**

Approximate number of current users : **50**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **C. R. Lansberry** Telephone No.: **(215)293-0660**

### **General Description**

Interactive in nature, the TEKTRONIX GRAPHICS LIBRARY\* (TGL) consists of two distinct packages: the PLOT-10 Terminal Control System (TCS) and the PLOT-10 Preview Routines for Calcomp Plotters.

PLOT-10 TCS (Release 3.3) is a collection of more than 100 Fortran and BAL subroutines. They are addressable in load module form, and give the user the ability to create programs which produce plots on any Tektronix 4010 series or 4006 terminal.

PLOT-10 Preview Routines provide a method of previewing plots programmed for a Calcomp plotter. The package contains a basic set of Calcomp-compatible subroutines and a number of utility subroutines which permit a high degree of flexibility for displaying plots in a timesharing mode. Subroutines are addressable in load module form and must be used with the PLOT-10 TCS.

\*Tektronix Graphics Library is a proprietary product of Tektronix, Inc., and has been licensed to SIS by Tektronix, Inc.

### **Special Features**

- Instant representation of graphic data.
- No costly generation of erroneous plots.
- Calcomp plots can be previewed on Tektronix terminal without program alteration.
- Plots can be generated by interactive or batch programs.



Company Name : **TEKTRONIX, INC.**

Headquarters Address : **P.O. Box 500, Beaverton, OR 97077**

Product Name : **PLOT 10 Easy Graphing**

Number of years commercially available : **1**

Date of last up-date or improvement : **June, 1978**

Approximate number of current users : **Multiple Companies**

Purchase price if available on in-house equipment : **Contact local Tektronix Field Office**

Type(s) of equipment compatible for in-house use : **Contact local Tektronix Field Office**

Headquarters contact : **Mr. Will Gallant** Telephone No.: **(503)644-0161**

### **General Description**

**Easy Graphing is a recent addition to the library of PLOT 10 interactive graphics software. PLOT 10 Easy Graphing provides presentation quality graphing to the mini computer and large systems user without the burden of programming. Easy Graphing is written in ANSI standard FORTRAN IV. Simple command verbs are used in a conversational manner to enter data and create graphs. Graphs with dashed lines, shaded bars, movable legends, and annotated pie charts are featured.**

**Using PLOT 10 Easy Graphing, presentation quality graphs may be hard copied from the terminal or captured in color for flip charts or overhead transparencies directly on a Tektronix 4662 plotter.**

### **Special Features**

**PLOT 10 Easy Graphing can read data from files created by most management information systems. The graphs may appear on all of the Tektronix Graphics Display Terminals. A Tektronix 4662 Interactive Digital Plotter can be used with Easy Graphing to produce multi colored overhead transparencies. Easy Graphing also has built-in capability to interpret mathematical statements for on-line manipulation and plotting of administrative or scientific data.**



Company Name : TEKTRONIX, INC.  
Headquarters Address : P.O. Box 500, Beaverton, OR 97077

Product Name : PLOT 10 Interactive Graphics Library  
Number of years commercially available : New  
Date of last up-date or improvement :  
Approximate number of current users :  
Purchase price if available on in-house equipment : Contact local Tektronix Field Office  
Type(s) of equipment compatible for in-house use : Contact local Tektronix Field Office  
Headquarters contact : Mr. Will Gallant  
Telephone No.: (503)644-0161

### General Description

Interactive Graphics Library (IGL) is the newest member of the PLOT 10 family of interactive graphics software. IGL supports all Tektronix 4010 and 4020 series graphics terminals as well as 4660 series plotters. Some of the features IGL software provides the user are:

**INTELLIGENCE** - Dynamic display manipulation  
Symbol selection  
Distributed graphics processing

**COLOR** — Tektronix 4027 color terminal support  
Polygon shading

**FUTURE CAPABILITY** - 3-D transformations  
Segmentation  
Special character fonts  
Line smoothing  
Special area paneling

### Special Features

PLOT 10 Interactive Graphics Library is one of the few available graphics software packages that is both computer and device display technology independent. IGL commands are also independent of additive, subtractive or fixed palette color systems.

A unique five-tiered structure provides a hierarchy from which the user may select only those capabilities currently needed. Support of new peripherals and other state-of-the-art graphics products may be added later, with no major coding changes.



Company Name : **TEKTRONIX, INC.**

Headquarters Address : **P.O. Box 500, Beaverton, OR 97077**

Product Name : **PLOT 10 Interactive Graphing Package**

Number of years commercially available : **2**

Date of last up-date or improvement : **March, 1978**

Approximate number of current users : **Multiple Companies; users unknown**

Purchase price if available on in-house equipment : **Contact local Tektronix Field Office**

Type(s) of equipment compatible for in-house use : **Contact local Tektronix Field Office**

Headquarters contact : **Mr. Will Gallant** Telephone No.: **(503) 644-0161**

### **General Description**

IGP is written in FORTRAN IV and built on top of the PLOT 10 Advanced Graphing II and Terminal Control Systems packages. IGP offers most of the same features as these, including logarithmic, log-log, time and cartesian coordinate graphs, bar charts, multiple curve plotting, calendar and short form data entry. It also provides the user with data symbols, grid and axis specifications, axis locations, labelling, and tic mark forms. In addition, IGP offers extensive data and graph editing capabilities as well as the ability to enter data or IGP commands interactively from files.

### **Special Features**

The package extends the capabilities of the fundamental Tektronix graphing software for 4000-Series graphics terminals to non-programmers as well as to programmers. By means of easy to learn, English-language Structured Commands, a user will be able to quickly construct, edit, save and recall graphs conversationally by the computer. Interactive Graphing guides you through the creation of graphs by means of messages which indicate errors or inform the user about required input. The package also provides a library of commands which you can access at any time either in part or totally by typing HELP.





Company Name : WARNER COMPUTER SYSTEMS, INC.  
Headquarters Address : 605 Third Avenue, New York, NY 10016

Product Name : PLOT  
Number of years commercially available : 3  
Date of last up-date or improvement : April, 1978  
Approximate number of current users : n.a.  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Al Bollinger

Telephone No.: (212)697-0110

### General Description

PLOT is a general two-dimensional plotting package. It offers point plotting of multiple dependent variables with the following option.

- Histograms
- Floating axes
- Rotated axes
- Quarterly titling
- Alternate plotting
- Plot titling and comment lines
- User-specified plot characters
- User-specified X- and Y-axis labels
- Strike over on or off
- APL or non-APL typeset
- Explicit result (vector or matrix)
- Option status display
- Input from a file or a global
- Fully conversational version with choice of long or short prompts

### Special Features

PLOT is a thoroughly generalized package. It's written in APL and can be exploited to the full by those who know that language, but the conversational interface makes most of its options available to non-APL users at any time sharing terminal.



Company Name : WARNER COMPUTER SYSTEMS, INC.

Headquarters Address : 605 Thlr Avenue, New York, NY 10016

Product Name : TEKDRAW

Number of years commercially available : 2½

Date of last up-date or improvement : June, 1978

Approximate number of current users : 15

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Al Bollinger

Telephone No.: (212)697-0110

### General Description

TEKDRAW is a definitive two-dimensional graphical input and display package for Tektronix 4000-series graphics terminals. It provides facilities for graphical display with multiple options given in simple English-language syntax. These options set grids and tics and floating axes, control window size and character size, place titles in or above the plot, and vary label formats. Scaling may be specified by the user or set automatically by the system. A ZOOM function resets the scaling to fit any portion of the plot.

TEKDRAW will generate scatter plots, point plots, continuous line plots, pie charts, bar charts, polar and logarithmic plots. Multiple dependant variable may be plotted as visually distinct curves — broken, dashed, etc. Graphical data entry makes it possible to store, edit and analyze data manually sketched in at the terminal.

TEKDRAW is written in APL but may also be run successfully by users unfamiliar with that language.

Since its inception, TEKDRAW has undergone several major upgrades:

- Arbitrary settings of any decorations
- General file interface
- Econometrics compatibility

TEKDRAW continues to grow in versatility.

### Special Features

TEKDRAW is a very complete graphics package distinguished by wholly modular architecture, simplicity of command syntax, and superior cost effectiveness.

Several new commands exist to make formatting of business related graphics and charts much easier.

**COMPANY INDEX**

<b>ADP Network Services, Inc.</b> .....	V.020 - V.022
<b>Avco Computer Services</b> .....	V.040
<b>CallData Systems, Inc.</b> .....	V.060
Citibank, N.A. ....	V.080
Commodity Information Services .....	V.100
Computel Systems Ltd. ....	V.120
Comshare, Inc. ....	V.140 - V.141
Comshare Limited .....	V.160
Data Resources, Inc. ....	V.180 - V.188
<b>General Electric Information Services Co.</b> .....	V.200 - V.202
Information Bank, The .....	V.220
<b>Informatics Inc., Data Services Div.</b> .....	V.240
<b>Insco Systems</b> .....	V.270
Interactive Data Corporation .....	V.260 - V.262
<b>Interactive Market Systems, Inc.</b> .....	V.280 - V.281
<b>I.P. Sharp Associates Limited</b> .....	V.300 - V.304
MJK Associates .....	V.320
<b>On-Line Systems, Inc.</b> .....	V.340 - V.341
<b>Rapidata, Inc.</b> .....	V.360 - V.361
<b>Scientific Time-Sharing Corporation</b> .....	V.380
<b>SDC Search Service</b> .....	V.400 - V.410
Service Bureau Company, The .....	V.420 - V.422
Value Line Data Services .....	V.440
<b>Warner Computer Systems, Inc.</b> .....	V.460 - V.461

\*Companies shown in **bold print** are Corporate Associate Members of ACU.

**SUBJECT INDEX**
**AGRICULTURE**

AGRICOLA .....	SDC Search Service .....	V.400
AGRICULTURE .....	Data Resources, Inc. ....	V.180
COMMODITIES .....	Data Resources, Inc. ....	V.180
WEATHER .....	Data Resources, Inc. ....	V.180
WORLD FERTILIZER MARKET .....	General Electric Information Services Co. ...	V.202

**AIRLINES**

ER586 DATA BASE .....	I.P. Sharp Associates Limited .....	V.300
FORM 41 DATA BASE .....	I.P. Sharp Associates Limited .....	V.300
INS .....	I.P. Sharp Associates Limited .....	V.300
OAG .....	I.P. Sharp Associates Limited .....	V.300
ORIGIN-DESTINATION DATA BASE .....	I.P. Sharp Associates Limited .....	V.300
T6 AIR CHARTER DATA BASE .....	I.P. Sharp Associates Limited .....	V.301

**BANKING**

BANCALL .....	ADP Network Services, Inc. ....	V.020
BANCOMPARE .....	ADP Network Services, Inc. ....	V.020
BANKANAL .....	The Service Bureau Company .....	V.420
BANKS OF CANADA WKLY FINAN. STAT. .	I.P. Sharp Associates Limited .....	V.301
CHARTERED BANKS (ANNUAL) .....	I.P. Sharp Associates Limited .....	V.301
CHARTERED BANKS (MONTHLY) .....	I.P. Sharp Associates Limited .....	V.301
CHARTERED BANKS (QUARTERLY) .....	I.P. Sharp Associates Limited .....	V.301
EURABANK .....	The Service Bureau Company .....	V.420
FDIC .....	Data Resources, Inc. ....	V.180
FDIC .....	Interactive Data Corporation .....	V.262
FDIC .....	The Service Bureau Company .....	V.420
FSLIC .....	The Service Bureau Company .....	V.420
U.S. WEEKLY BANKING .....	Data Resources, Inc. ....	V.180

## BIOLOGY

BIOCODES .....	SDC Search Service .....	V.400
BIOSIS AND BIO6973 .....	SDC Search Service .....	V.401

## BUSINESS

ACCOUNTANT'S INDEX .....	SDC Search Service .....	V.400
CANADIAN BUS. PERIODICALS INDEX .....	SDC Search Service .....	V.402
CANADIAN NEWS INDEX .....	SDC Search Service .....	V.403
CONTICURRENCY FRGN. EXCH. RATES .....	ADP Network Services, Inc. ....	V.020
FUNDAMENTAL DATA BASE .....	I.P. Sharp Associates Limited .....	V.301
INFORM .....	SDC Search Service .....	V.405
MANAGEMENT .....	SDC Search Service .....	V.406
P/E NEWS .....	SDC Search Service .....	V.407
PROMPT .....	SDC Search Service .....	V.408
VSCOM-190 .....	Comshare Limited .....	V.160

## CHEMISTRY

CAS77 .....	SDC Search Service .....	V.401
CAS7276 .....	SDC Search Service .....	V.401
CHEMDEX .....	SDC Search Service .....	V.402
CHEMICAL INDUSTRY NOTES .....	SDC Search Service .....	V.402

## COMMODITIES

COMMODITY DATA INFO. SERVICE .....	MJK Associates .....	V.320
COMMODITY FUTURES .....	Commodity Information Services .....	V.100
COMMODITY FUTURES DATABASE .....	General Electric Info. Serv. Co. ....	V.201
IMM CURRENCY FUTURES .....	Commodity Information Services .....	V.100
INTEREST RATE FUTURES .....	Commodity Information Services .....	V.100
INTEREST RATE FUTURES (YIELD) .....	Commodity Information Services .....	V.100
U.S. GOV'T DEBT, INSTRUMENTS .....	Commodity Information Services .....	V.100

## CONSTRUCTION

ORR SYSTEM .....	The Service Bureau Company .....	V.421
------------------	----------------------------------	-------

## DEMOGRAPHIC

CENSUS 71 DATA BASE .....	I.P. Sharp Associates Limited .....	V.301
CENSUS TRACT DATA .....	Data Resources, Inc. ....	V.181
CONSUMER EXPENDITURE SURVEY .....	Data Resources, Inc. ....	V.181
CURRENT POPULATION SURVEY .....	Data Resources, Inc. ....	V.181
PROFILES WORKFORCE CENSUS .....	Comshare, Inc. ....	V.141
SITE II .....	ADP Network Services, Inc. ....	V.020
SITE II .....	Comshare, Inc. ....	V.141
SITE II .....	General Electric Info. Serv. Co. ....	V.202
SITE II .....	The Service Bureau Company .....	V.422
TRADAREAS .....	CallData Systems, Inc. ....	V.060

## ECONOMICS

BALANCE OF PAYMENTS .....	Rapidata, Inc. ....	V.360
BI/DATA .....	General Electric Info. Serv. Co. ....	V.200
BUSINESS CONDITIONS DIGEST .....	ADP Network Services, Inc. ....	V.021
CALIFORNIA .....	Data Resources, Inc. ....	V.181
CANADA .....	Data Resources, Inc. ....	V.183
CANSIM .....	Computel Systems, Inc. ....	V.120
CANSIM MINI-BASE .....	Comshare Limited .....	V.160
CANSIM MINI-BASE .....	I.P. Sharp Associates Limited .....	V.302
CHASE ECONOMETRIC ASSOCIATES .....	Interactive Data Corporation .....	V.260
CITIBANK ECONOMIC DATABASE .....	Rapidata, Inc. ....	V.360
CITIBASE .....	Comshare, Inc. ....	V.140
CITIBASE .....	Insco Systems .....	V.270
CITIBASE ECONOMIC DATABASE .....	General Electric Info. Serv. Co. ....	V.201
CITIBASE (NBER) .....	Scientific Time-Sharing Corporation .....	V.380
CONFERENCE BOARD DATA BASE .....	ADP Network Services, Inc. ....	V.021
CONFERENCE BOARD, INC., THE .....	Interactive Data Corporation .....	V.261
CONSUMER PRICE INDICES .....	I.P. Sharp Associates Limited .....	V.302
CONSUMER PRICE INDEX .....	ADP Network Services, Inc. ....	V.022
CURRENCY DATA BASE .....	I.P. Sharp Associates Limited .....	V.302
CURRENCY EXCHANGE .....	General Electric Info. Serv. Co. ....	V.200
DRI CAPSULE DATA BASE .....	The Service Bureau Company .....	V.421
DRI CENTRAL DATA BANK .....	Data Resources, Inc. ....	V.182
EUROPEAN NAT'L SOURCE BANK .....	Data Resources, Inc. ....	V.183
EXRATE .....	Data Resources, Inc. ....	V.183
FINANCIAL DATA BASE .....	ADP Network Services, Inc. ....	V.021
FLOW OF FUNDS DATA BASE .....	ADP Network Services, Inc. ....	V.021



INTERNATIONAL DATA BASE .....	ADP Network Services, Inc. ....	V.021
INT'L FINANCIAL STATISTICS .....	Rapidata, Inc. ....	V.360
INT'L MONETARY FUND .....	I.P. Sharp Associates Limited .....	V.702
INT'L MONETARY FUND .....	Data Resources, Inc. ....	V.183
LABORDOC .....	SDC Search Service .....	V.406
METALS WEEK .....	Interactive Data Corporation .....	V.261
MIDWEST ECONOMETRICS, INC. ....	Interactive Data Corporation .....	V.261
NAT'L ASSOC. OF HOME BUILDERS .....	Interactive Data Corporation .....	V.261
NAT'L BUREAU OF ECON. RES. ....	Informatics Inc., Data Serv. Div. ....	V.240
NBER DATA BASE .....	I.P. Sharp Associates Limited .....	V.302
NFS DATA BASE .....	I.P. Sharp Associates Limited .....	V.303
NRI/E .....	General Electric Info. Serv. Co. ....	V.200
OECD DATA BANKS .....	Data Resources, Inc. ....	V.183
OECD DATA BASES .....	ADP Network Services, Inc. ....	V.022
REGIONAL DATA ASSOCIATES .....	Interactive Data Corporation .....	V.261
REGIONAL DATA BASE .....	ADP Network Services, Inc. ....	V.020
STND. METRO. STAT. AREA MACRO .....	ADP Network Services, Inc. ....	V.020
STATE & AREA FORECASTING .....	Data Resources, Inc. ....	V.182
UCLA NAT'L BUSINESS FORECAST .....	General Electric Info. Serv. Co. ....	V.200
UKCSO DATA BASE .....	I.P. Sharp Associates Limited .....	V.303
UK MACROECONOMIC .....	ADP Network Services, Inc. ....	V.021
U.S. ECONOMIC DATA BASE .....	ADP Network Services, Inc. ....	V.020
U.S. PRICES .....	Data Resources, Inc. ....	V.182
U.S. REGIONAL DATA BANK .....	Data Resources, Inc. ....	V.182
WARD'S AUTOINFOBANK .....	Interactive Data Corporation .....	V.261
WHOLESALE PRICE INDEX .....	ADP Network Services, Inc. ....	V.021
WORLD BANK DATA BASES .....	Data Resources, Inc. ....	V.184

**EDUCATION**

ERIC .....	SDC Search Service .....	V.404
------------	--------------------------	-------

**ENERGY**

APILITT .....	SDC Search Service .....	V.400
CENSUS OF COAL MINES DATA BASE .....	ADP Network Services, Inc. ....	V.022
ENERGY .....	Data Resources, Inc. ....	V.184
ENERGYLINE .....	SDC Search Service .....	V.404
OIL AND GAS JOURNAL DATA BANK .....	Data Resources, Inc. ....	V.185
P/E NEWS .....	SDC Search Service .....	V.407
PETRODATA .....	I.P. Sharp Associates Limited .....	V.303
PETROLEUM DATA SYSTEMS .....	General Electric Info. Serv. Co. ....	V.202
PLATT'S DATA BANK .....	Data Resources, Inc. ....	V.185
POLLUTION .....	SDC Search Service .....	V.408
TULSA .....	SDC Search Service .....	V.410

**ENGINEERING**

COMPENDEX .....	SDC Search Service .....	V.403
ISMEC .....	SDC Search Service .....	V.406
TULSA .....	SDC Search Service .....	V.410

**ENVIRONMENT**

ENVIROLINE .....	SDC Search Service .....	V.404
NEELS .....	I.P. Sharp Associates Limited .....	V.303
POLLUTION .....	SDC Search Service .....	V.408
TULSA .....	SDC Search Service .....	V.410

**FINANCE**

BAMACS .....	Data Resources, Inc. ....	V.186
CONFERENCE BOARD .....	Data Resources, Inc. ....	V.186
COMPUSTAT .....	ADP Network Services, Inc. ....	V.022
COMPUSTAT .....	Data Resources, Inc. ....	V.186
COMPUSTAT .....	Interactive Data Corporation .....	V.262
DATABASE .....	Citibank, N.A. ....	V.080
EXSTAT .....	ADP Network Services, Inc. ....	V.022
EXSTAT .....	Interactive Data Corporation .....	V.262
FEDERAL RESERVE BANK OF S.F. ....	Rapidata, Inc. ....	V.361
FINANCIAL DATA BANK .....	Warner Computer Systems, Inc. ....	V.460
FLOW OF FUNDS .....	Data Resources, Inc. ....	V.186

IBJDATA .....	General Electric Info. Serv. Co. ....	V.201
IMF DATA BASE .....	Comshare, Inc. ....	V.140
PRO FORMA DATABANK .....	Data Resources, Inc. ....	V.186
RAPIDQUOTE .....	Rapidata, Inc. ....	V.361
STANDARD & POOR'S .....	Data Resources, Inc. ....	V.186
VALUE LINE DATA BASE .....	Comshare, Inc. ....	V.140
VALUE LINE .....	Data Resources, Inc. ....	V.187
VALUE LINE .....	General Electric Info. Serv. Co. ....	V.201
VALUE LINE .....	Interactive Data Corporation .....	V.262
VALUE LINE .....	Value Line Data Services .....	V.440

#### GOVERNMENT

CONGRESSIONAL INFO. SERV. INDEX ....	SDC Search Service .....	V.403
CRECORD .....	SDC Search Service .....	V.404
FAPRS .....	The Service Bureau Company .....	V.421
FEDERAL REGISTER .....	SDC Search Service .....	V.404
U.S. POLITICAL SCIENCE DOCUMENTS ..	SDC Search Service .....	V.410

#### GRANTS

GRANTS .....	SDC Search Service .....	V.405
--------------	--------------------------	-------

#### INDUSTRY

COST FORECASTING DATA BANK .....	Data Resources, Inc. ....	V.187
FOOD SCIENCE AND TECHNOLOGY .....	SDC Search Service .....	V.405
FORESIM .....	Data Resources, Inc. ....	V.187
LABORDOC .....	SDC Search Service .....	V.406
METALS WEEK DATA BASE .....	ADP Network Services, Inc. ....	V.022
PAPER AND PULP .....	Data Resources, Inc. ....	V.187
PAPERCHEM .....	SDC Search Service .....	V.407
PETROCHEMICALS .....	Data Resources, Inc. ....	V.187
STEEL .....	Data Resources, Inc. ....	V.187
TITUS .....	SDC Search Service .....	V.409

#### INSURANCE

ACTUARIAL DATA BASE .....	I.P. Sharp Associates Limited .....	V.304
BEST EXECUTIVE DATA .....	Data Resources, Inc. ....	V.188
LIFE RATES DATA BASE .....	The Service Bureau Company .....	V.422

#### MARKETING

ARBITRON TV/RADIO .....	Interactive Market Systems, Inc. ....	V.280
ARMS II .....	Interactive Market Systems, Inc. ....	V.280
BAR NETWORK/SPOT TV .....	Interactive Market Systems, Inc. ....	V.280
CANADIAN PMB .....	Interactive Market Systems, Inc. ....	V.280
MARKET STATISTICS .....	On-Line Systems, Inc. ....	V.340
MARKET STATISTICS .....	Rapidata, Inc. ....	V.361
NIelsen RETAIL INDEX .....	Interactive Market Systems, Inc. ....	V.281
NIelsen STATION/TV INDICES .....	Interactive Market Systems, Inc. ....	V.281
ORC YOUTH .....	Interactive Market Systems, Inc. ....	V.280
SAMI .....	Interactive Market Systems, Inc. ....	V.280
SIMMONS .....	Interactive Market Systems, Inc. ....	V.281
TARGET GROUP INDEX .....	Data Resources, Inc. ....	V.188
TGI .....	Interactive Market Systems, Inc. ....	V.281

#### MEDICAL

PHARMACEUTICAL NEWS INDEX .....	SDC Search Service .....	V.407
RINGDOC .....	SDC Search Service .....	V.409

#### MULTI DISCIPLINARY

COMPREHENSIVE DISSERTATION INDEX ..	SDC Search Service .....	V.402
COMPUSTAT .....	SDC Search Service .....	V.420
CONFERENCE PAPERS INDEX .....	SDC Search Service .....	V.403
CONGRESSIONAL INFO. SERV. INDEX ....	SDC Search Service .....	V.403
FEDERAL REGISTER .....	SDC Search Service .....	V.404
LIBCON .....	SDC Search Service .....	V.406
NTIS .....	SDC Search Service .....	V.407
SSIE .....	SDC Search Service .....	V.420



**NEWS**

INFORMATION BANK, THE .....	The Information Bank .....	V.220
NEWSPAPER INDEX .....	SDC Search Service .....	V.407
P/E NEWS .....	SDC Search Service .....	V.407
QUEBEC-ACTUALITE .....	SDC Search Service .....	V.408

**PATENTS**

APIPAT .....	SDC Search Service .....	V.400
WPI .....	SDC Search Service .....	V.410

**SCIENCE**

CAMBRIDGE SCIE. ABSTRACTS GROUP ..	SDC Search Service .....	V.401
COLD REGIONS .....	SDC Search Service .....	V.403
FOOD SCIENCE & TECHNOLOGY .....	SDC Search Service .....	V.405
GEOREF .....	SDC Search Service .....	V.405
INSPEC .....	SDC Search Service .....	V.405
PAPERCHEM .....	SDC Search Service .....	V.407
POLLUTION .....	SDC Search Service .....	V.408
RINGDOC .....	SDC Search Service .....	V.409
TITUS .....	SDC Search Service .....	V.409

**SOCIAL SCIENCE**

LABORDOC .....	SDC Search Service .....	V.406
LISA .....	SDC Search Service .....	V.406
PSYCH ABS .....	SDC Search Service .....	V.408
U.S. POLITICAL SCIENCE DOCUMENTS ..	SDC Search Service .....	V.410

**STATISTICAL INDEX**

AMERICAN STATISTICS INDEX .....	SDC Search Service .....	V.400
---------------------------------	--------------------------	-------

**STOCKS AND BONDS**

CANADIAN STOCK OPTIONS .....	I.P. Sharp Associates Limited .....	V.304
EARLYOPT .....	The Service Bureau Company .....	V.421
EZCHART .....	Avco Computer Services .....	V.040
EZSTOCK .....	Avco Computer Services .....	V.040
FASTOCK DATA BASE .....	ADP Network Services, Inc. ....	V.022
I/B/E/S SUMMARY STATISTICS .....	Interactive Data Corporation .....	V.262
INT'L SECURITIES DATA BASE .....	Interactive Data Corporation .....	V.262
MISTI .....	The Service Bureau Company .....	V.421
MUNIPRICE .....	The Service Bureau Company .....	V.422
OASES .....	On-Line Systems, Inc. ....	V.341
PRICES/SPLIT DIVIDEND .....	Interactive Data Corporation .....	V.262
SECURITIES DATA BASE .....	Data Resources, Inc. ....	V.188
SECURITIES DATABASE SYSTEM .....	General Electric Info. Serv. Co. ....	V.202
SPOT RATES .....	Interactive Data Corporation .....	V.262
STOCK EXCHANGE .....	I.P. Sharp Associates Limited .....	V.304
STOCK MARKET .....	Warner Computer Systems, Inc. ....	V.461

**TRANSPORTATION**

SAE ABSTRACTS .....	SDC Search Service .....	V.409
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*Company Name* : ADP NETWORK SERVICES, INC.  
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*Headquarters contact* : John Gale *Telephone No.:* (313) 769-6800

Subject	Description
<b>BANKING</b>	<p><b>Bancompare</b> The Bancompare Data Base provides 800 key financial data items on 250 public banks and bank holding companies.</p> <p><b>Bancall</b> The Bancall Data Base contains the Reports of Condition and Income for all U.S. Insured commercial banks and over 200 line items for each bank over the past five years on a semi-annual basis.</p>
<b>BUSINESS</b>	<p><b>ContiCurrency Foreign Exchange Rates Data Base</b> The FX Data Base provides daily, weekly, monthly, quarterly and annual rates on 33 currencies. The data base spans 30 years. ContiCurrency provides a variety of forecasts and currency exchange news and analysis in addition to spot and forward rates for major currencies.</p>
<b>DEMOGRAPHIC</b>	<p><b>SITE II</b> SITE II provides U.S. Census data and population projections for demographic reporting.</p>
<b>ECONOMICS</b>	<p><b>U.S. Economic Data Base</b> The U.S. Economic Data Base contains over 8,500 economic time series of monthly, quarterly, and annual data, including: all standard macroeconomic variables in the National Income Accounts; industry data at the two, three and four-digit SIC level; and most data in the Survey of Current Business.</p> <p><b>Regional Data Base</b> The Regional Data Base contains economic information for the states and regions of the United States. Series available are: montly data, quarterly data and annual data.</p> <p><b>Standard Metropolitan Statlstical Area Macro Data Base</b> More than 14,000 series in the data base contain information on employment personal income, housing permits, and department store sales in 261 SMSAs.</p>



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**Subject**

**Description**

**ECONOMICS**

***International Data Base***

The International Data Base contains over 25,000 quarterly and annual series from more than 100 countries, updated on a monthly basis. The series include: statistics on international liquidity; monetary authority; commercial banks; international transactions; government finance; and national income.

***UK Macroeconomic Data Base***

The United Kingdom Macroeconomic Data Base from the Central Statistics Office of the U.K. contains over 1850 series of monthly, quarterly, and annual data. Series categories include: Industrial Production Indexes; National Income and Expenditure; Balance of Payments; Price Indexes; Wages and Earnings Indexes; Population and Manpower.

***Flow of Funds Data Base***

The Flow of Funds Data Base contains over 2,000 series, beginning in 1952, showing the financial flows between different sectors of the economy.

***Financial Data Base***

The Financial Data Base contains approximately 1,600 time series of weekly, monthly, and quarterly series including measures of monetary reserves, major tables from the Federal Reserve Bulletin, Interest rates, money supply, mortgage debt and loans, and construction activity.

***Business Conditions Digest Data Base***

The BCD Data Base contains approximately 500 time series from the publication of the U.S. Bureau of Economic Analysis. Series include cyclical indicators, anticipations and intentions, analytical measures, international comparisons, and other key indicators.

***Conference Board Data Base***

The Conference Board Data Base contains over 300 time series on discretionary purchasing power and spending, newly approved capital appropriations and related series, and constant dollar appropriations for manufacturing industries.

***U.S. Bureau of Labor Statistics Wholesale Price Index***

The Wholesale Price data base includes a complete listing of monthly prices from 1958 to the present for over 2700 detailed commodities.



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Subject	Description
ECONOMICS	<p><b>U.S. Bureau of Labor Statistics Consumer Price Index</b> The Consumer Price Data Base contains approximately 1400 time series on a monthly basis for the entire United States and 23 major cities as collected and distributed by the U.S. Bureau of Labor Statistics.</p> <p><b>OECD Data Bases</b> The OECD Data Bases provide National Income Accounts and Main Economic Indicators covering unemployment, industrial production, money supply, interest rates, orders, man-hours, CPIs and WPIs for OECD (Organization for Economic Cooperation and Development) member nations and regions.</p>
ENERGY	<p><b>Census of Coal Mines Data Base</b> The Census of Coal Mines Data Base is information on each company headquarters and mine/plant unit in Keystone's Mine Directory Sections of the annual Keystone Coal Industry Manual, by McGraw Hill. The base is regularly updated with new information and changes throughout the year.</p>
FINANCE	<p><b>COMPUSTAT Data Base</b> The COMPUSTAT Data Base contains financial data on over 3,500 U.S. companies. Annual series span 20 years and quarterly series cover 10 years. Income statements, balance sheet and stock market data is available. The data base is updated weekly.</p> <p><b>EXSTAT Data Base</b> The EXSTAT Data Base contains 160 items from the annual income statements and balance sheets of approximately 2000 foreign companies. The data covers 5 years.</p>
INDUSTRY	<p><b>Metals Week Data Base</b> The Metals Week Data Base contains information on cost of metals as reported weekly in Metals Week Magazine, published by McGraw Hill.</p>
STOCKS & BONDS	<p><b>FASTOCK Data Base</b> FASTOCK is a securities data base system containing current and historical tradings, and financial and descriptive data for more than 27,000 security issues of all types. Four to ten years of historical data is available on the securities.</p>



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*Headquarters Address* : 201 Lowell Street, Wilmington, MA 01887  
*Headquarters contact* : Stephen G. Marvin *Telephone No.:* (617) 729-7700

**Subject**

**Description**

**STOCK AND BONDS**

**EZSTOCK**

The entire universe of securities traded on the New York and American Stock Exchanges can be easily and economically accessed and studied through the EZSTOCK Interactive Inquiry System. This stock market data base is updated on a daily basis after the close of the markets.

The data base includes current and historical high, low, close and volume statistics, as well as indicated annual dividends, earnings, stock splits and issue status. A number of statistical and financial analysis tools are available to the user including a portfolio evaluation system. (Data base maintained by Telstat Systems, Inc.)

**STOCK AND BONDS**

**EZCHART**

An on-line plotting capability is provided through EZCHART which allows the EZSTOCK user to create stock charts at their terminal. A number of common stock charting formats can be selected to analyze trends of individual stocks or industry groups.

EZCHART can also be used to create high resolution stock charts on an off-line Information International FR80 Graphic Recorder System. Output can be on microfilm, microfiche and photo hardcopy that are well suited for detailed analysis and publication.

*Company Name* : COMMODITY INFORMATION SERVICES  
*Headquarters Address* : 175 West Jackson Blvd., Chicago, IL 60604  
*Headquarters contact* : Donald Jones, Manuel Abundis      *Telephone No.:* (312) 922-3661

Subject	Description
COMMODITIES	<p><b>COMMODITY FUTURES</b></p> <ul style="list-style-type: none"> <li>• Daily update data in "newspaper" format (all commodities for a particular date in one file). Data consists of open, high, low, settlement, volume and open interest. Term: Past 30 days. Coverage: all agricultural, metal, wood, etc. commodity futures.</li> <li>• Current history on the above futures extending over the life of contract, arranged on a per future basis.</li> <li>• Expired futures going back to 1967.</li> </ul> <p><b>INTEREST RATE FUTURES</b></p> <ul style="list-style-type: none"> <li>• Daily update data in "newspaper" format (all commodities for a particular date in one file). Data consists of open, high, low, settlement, volume and open interest. Term: Past 30 days. Coverage: all interest rate instruments.</li> <li>• Current history on the above futures extending over the life of contract, arranged on a per future basis.</li> <li>• All expired futures since inception of trading (1976).</li> </ul> <p><b>INTEREST RATE FUTURES (YIELD)</b></p> <ul style="list-style-type: none"> <li>• Not available in "newspaper" format.</li> <li>• Current history on the above futures extending over the life of contract, arranged on a per future basis. Yields are carried instead of prices.</li> <li>• Expired futures going back to 1967.</li> </ul> <p><b>IMM CURRENCY FUTURES</b></p> <ul style="list-style-type: none"> <li>• Daily update data in "newspaper" format (all commodities for a particular date in one file). Data consists of open, high, low, settlement, volume and open interest. Term: Past 30 days. Coverage: all traded futures.</li> <li>• Current history on the above futures extending over the life of contract, arranged on a per future basis.</li> <li>• Expired futures since 1976.</li> </ul> <p><b>U.S. GOVERNMENT DEBT INSTRUMENTS (CASH)</b></p> <ul style="list-style-type: none"> <li>• Daily update data in "newspaper" format. Open and high positions have asked, low and close have bid and the open interest carries the yield. Coverage: all cash bonds, T-bills and GNMA's.</li> <li>• Current history starting from January 1, 1978.</li> <li>• Expires since January 1, 1978.</li> </ul>

*Company Name* : COMPUTEL SYSTEMS LTD  
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*Headquarters contact* : L. H. Roddick, CITS Data Base Mgt. *Telephone No.:* (613) 746-4353

**Subject**
**Description**
**ECONOMICS**
**CANSIM\* - Canadian Indicator Time Series (CITS)**

The Canadian Indicator Time Series Service (CITS) data base is a subset of the Canadian Socio-Economic Information Management System (CANSIM\*) data base maintained by Statistics Canada. CITS contains the monthly, quarterly, and annual series of significant interest to economic researchers in Canada. The series are related primarily to the Canadian economy, but the important United States data points are also included.

The major subject areas are:

- |                             |                              |
|-----------------------------|------------------------------|
| • Population                | • Food and agriculture       |
| • Labour force              | • Fuel, power and mining     |
| • Consumer prices           | • Transportation             |
| • Industry selling prices   | • National accounts          |
| • Wholesale prices          | • Financial flow accounts    |
| • Security prices           | • Balance of payments        |
| • Domestic production       | • External trade             |
| • Domestic sales            | • Manufacturing              |
| • Construction              | • Financial institution data |
| • Bank of Canada Statistics |                              |

The data base is maintained on-line on the two IBM 370/168 machines and on the UNIVAC 1108. Updates to the CITS database are applied within 24 hours of their public dissemination on CANSIM.

On the IBM systems, CITS is accessible interactively via TSO and in batch mode from FORTRAN via an ASSEMBLER subroutine. In addition, some application software packages, in particular INFORMETRICA's version of MASSAGER, have been modified so that they can access the data base. On the UNIVAC system, CITS is accessible via the Bank of Canada's version of MASSAGER and interactively via DEMAND.

There are approximately 25,000 time series; each series contains the available datapoints from January 1953 to date. Detailed descriptions of the time series can be found in the CANSIM\* directory available from Statistics Canada. The CITS content is reviewed regularly with a view towards keeping it responsive to the needs of its users.

\* Registered Trade Mark of Statistics Canada





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Subject	Description
FINANCE	<p><b><i>The IMF Data Base</i></b></p> <p>This Data Base contains more than 15,000 data series from over 150 countries. Included in those series are exchange rates, international liquidity, money supply, interest rates, prices, production, imports and exports, national income accounts, and financing. Where available, data extends backward in monthly observations to 1947. Five years of monthly, ten years of quarterly, and thirty years of annual data for more than 5,000 of the most frequently used series are included in the data base. (Maintained by International Monetary Fund)</p>
FINANCE	<p><b><i>The Value Line Data Base</i></b></p> <p>This Data Base encompasses both historic annual and quarterly financial histories and projections for over 1,500 major industrial, retail, utility and transportation companies plus banks, insurance carriers, savings and loan associations, and finance companies. Annual financial data is available for the past 22 years while the quarterly information dates back to 1963. The Value Line Data Base is useful in investment decisions, acquisitions and merger analysis, and any other financial analysis area that requires a thorough understanding of historical company information. (Maintained by Arnold Bernhard &amp; Co. Inc.)</p>
ECONOMICS	<p><b><i>Citibase</i></b></p> <p>This Data Base contains national economic data drawn from such sources as the National Income and Product Accounts, Business Conditions Digest and Economic Indicators. Most of the information extends back to 1947. The comprehensive macro-economic data provides a valuable tool for analysis of the environment in which a corporation operates. (Maintained by Citibank)</p>
REPLACEMENT COST	<p><b><i>VSCOM-190</i></b></p> <p>This Replacement Cost Measurement system provides a solution to the Security and Exchange Commission's requirement to report replacement cost information on Fixed Assets and Inventory. It has an extensive data base of foreign and domestic index data to assist in the calculation of replacement cost. Currently, the Index Data Base contains more than 5,000 index data series from the U.S., Canada and the countries of the European Economic Community. In addition to SEC reporting, this data is helpful in Capital Investment Comparisons, Salary Negotiations and Return on Investment Measurement. (Maintained by Valuation Systems Corporation)</p>



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**Subject**

**Description**

**DEMOGRAPHIC**

***Profiles Workforce Census Data Base***

This Data Base contains workforce statistics from the Sixth Count of the 1970 Census of Population. Numbers of employed persons 16 years or older are available by race and sex for more than 500 occupations. Subscribers may extract occupational data for any of these geographic areas: the entire U.S., each of the 50 states, the District of Columbia, any state's urban areas, rural nonfarm areas, Standard Metropolitan Statistical Areas (SMSA), SMSA counties, and SMSA cities/places with a population of 50,000 or more.

**DEMOGRAPHIC**

***Site II***

Site II is based on the 1970 Census of Population and Housing, with 1975 population and household estimates. It contains comprehensive demographic information for over 60,000 geographic areas in the United States. The type of data available by geographic area are items such as Total Population; Population by Race, Age, and Sex; Total and Median Family Income; Average Home Value and Rental; Occupation; and Education. Household information is also provided within these geographic areas. (Maintained by CACI, Inc.)



*Company Name* : GENERAL ELECTRIC INFORMATION SERVICES COMPANY  
*Headquarters Address* : 401 North Washington Street, Rockville, MD 20850  
*Headquarters contact* : Carol Herrick *Telephone No.:* (301) 340-5202

**Subject**

**Description**

**ECONOMICS**

***Currency Exchange Database***

Provides opening and closing data on 34 currencies for 32 countries, futures for 1,3,6 and 12 months. Monthly data on 51 currencies for 48 countries includes monthly average and close rates, wholesale price index and central bank discount rate. Annual data, including the GNP deflator as well as rates and prices, are available for 48 countries. Daily data is provided by the International Treasury Division of Marine Midland Bank; monthly and annual data is obtained from the International Monetary Fund.

***NRI/E - Japan Economic and Business Data Bank***

Offers macroeconomic data on the Japanese economy, data on Japanese industries and their products, and forecasts of the Japanese economy. In addition to yearly, quarterly and monthly data, NRI/E provides weekly data, updated on Monday, covering rates on call money and bills, stock and bond market data, yen quotations and market prices for various staple commodities. (Maintained by Noruma Research Institute.)

***UCLA National Business Forecast Databases***

Include historical times series on over 200 U.S. economic variables, short term forecasts for eight quarters into the future and 10 years of annual forecasts for the long term outlook. Data included are consumer spending and retail sales, housing, plant and equipment expenditures, inventory investment, government spending, employment and unemployment, personal income and corporate profits, prices and wages, and various financial information. The forecasts are prepared by the UCLA Business Forecast Project. (Maintained by UCLA Business Forecast Project Management Research Associates.)

***BI/DATA***

Contains statistics describing the national accounts, demographics, labor force, trade, price trends and production of 70 of the world's most important economies. Additionally, includes forecasts for 35 international countries. Data is sourced from major international organizations such as the UN, the OECD and the IMF, augmented by statistical reports from individual countries and continuously reviewed by BI's professional staff of economists and area specialists. (Maintained by Business International Corporation.)



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**Subject**

**Description**

**ECONOMICS**

***Citibase Economic Database***

Includes weekly, monthly, quarterly and annual statistics on the U.S. economy. Over 3000 time series covering the National Income and Product Accounts, financial data, international transactions, plant and equipment spending, consumer and manufacturers price indices, employment and earning data, and Federal Reserve Board production indices. Various projections are also included.

(Maintained by the Economics Department of Citibank, N.A.)

**FINANCE**

***IBJDATA***

Includes balance sheet, income statement and stock price information on the major international oriented industrial companies in Japan. 35 annual financial items on 100 Japanese companies are currently included in the database. The data items have been chosen by IBJ to offer a meaningful basis of evaluation and comparative analysis to stock analysts, company managers, government and banking institutions in Japan as well as elsewhere.

(Maintained by the Industrial Bank of Japan.)

***Value Line Database***

Contains historical financial statements and projection data for over 1600 U.S. companies and 80 industry composites. Also contains annual and quarterly income statement, balance sheet, and sources and uses of funds data on major companies from the industrial, transportation, utility and retail sectors of the economy as well as various financial institutions. Integral parts of the database offering are financial ratios, rates of return, profit margins and per share figures for ease of reporting. Annual items begin in 1955, quarterly items in 1963.

(Maintained by Value Line Data Services, a division of Arnold Bernhard & Co.)

**COMMODITIES**

***Commodity Futures Database***

Contains open, high, low and close prices on most actively traded commodity futures contracts. History includes data from January 2, 1975 to present. In addition to the database, several retrieval and reporting programs aid in the use of this information.

(Maintained by CISCOR, Inc.)

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Subject	Description
<b>STOCKS &amp; BONDS</b>	<p><b>Securities Database System</b></p> <p>Provides descriptive, financial and trading information on over 35,000 different securities plus retrieval and reporting programs for simple portfolio valuations. Data included in the database are daily high, low and close prices and volumes, retained for 32 to 39 calendar days; weekly price data retained for 53 weeks and monthly data retained for 23 months. Also available are dividend and stock splits, earnings and bond payment data, retained for two years. Issue types include stocks, bond, options, mutual funds, foreign issues, U.S. government securities and market indices. All major U.S. and most Canadian exchanges are included.</p>
<b>AGRICULTURE</b>	<p><b>World Fertilizer Market Information Service</b></p> <p>World fertilizer production capacity catalogued by company name, location, product and capacity, and scheduled years of operation for projected new units. Annual world fertilizer production, consumption and trade by product and country for the years 1962 through the latest reported year. Included in the service are various programs designed to aid the user in the retrieval and reporting of this information.</p> <p>(Maintained by Tennessee Valley Authority.)</p>
<b>DEMOGRAPHIC</b>	<p><b>SITE II</b></p> <p>Specialized demographic data retrieval system based on the 1970 Census of Population and Housing. Generates reports on areas in the U.S. of any size or shape including geographically defined areas such as zip codes. Information on population, households, income, age and sex distribution, occupations, home and rent values, etc. is provided with certain items updated to reflect the latest years' estimates. The data is used for site-location analysis, market-penetration studies, advertising, etc.</p> <p>(Maintained by CACI, Inc. in Arlington, Virginia.)</p>
<b>ENERGY</b>	<p><b>Petroleum Data System</b></p> <p>Contains data on every field and pool in the U.S. and Canada. PDS currently consists of information publicly reported for 32 states in the U.S., the outer continental shelf and the Canadian provinces. Fields and pools can be searched on the basis of geologic province or basin as well as by political or administrative districts.</p> <p>(Maintained by the University of Oklahoma.)</p>



APPLICATIONS  
DIRECTORY

## Data-Bases Available to Users

V.220

*Company Name* : THE INFORMATION BANK  
*Headquarters Address* : 1719A Route 10, Parsippany, NJ 07054  
*Headquarters contact* : Carl O. Keil, Jr. *Telephone No.:* (201) 539-5850

### Subject

**NEWS &  
MULTIDISCIPLINARY**

### Description

#### ***The Information Bank***

The Information Bank is a time-shared information storage and retrieval system. Updated daily, it contains a data base of informative abstracts of news and other editorial material published in The New York Times and 62 other general interest and specialized publications including the Wall Street Journal, Business Week, The Washington Post, and the Financial Times (London). The data base is from 1969 to current and contains over 1,500,000 entries. The Information Bank is designed to respond to the current as well as retrospective information requirements of major corporations and business executives, public and academic libraries and librarians, and government agencies and officials.

*Mr. Michael Israel*

*Date:* January, 1979

*Submitted by:* James L. Bauer, Vice President



*Company Name* : INFORMATICS INC. - DATA SERVICES DIVISION  
*Headquarters Address* : 6 Kingsbridge Road, Fairfield, NJ 07006  
*Headquarters contact* : Mrs. Parichehr Hanly *Telephone No.:* (201) 575-2800

**Subject**

**Description**

**ECONOMICS**

***National Bureau of Economic Research Time Series Data Bank***

Monthly, quarterly and annual time series data, updated on a monthly basis, covering more than 3000 time series most of which extend back to 1947. The data bank consists of financial series; industrial series; population, labor force, employment and earnings; national income and product accounts which are subsectioned into gross national product, personal income and outlay, government receipts and expenditures, foreign transactions, savings and investment and others; and forecast series.





*Company Name* : INTERACTIVE DATA CORPORATION  
*Headquarters Address* : 486 Totten Pond Road, Waltham, MA 02154  
*Headquarters contact* : Manager, Product Development *Telephone No.:* (617) 890-1234

Subject	Description
<b>ECONOMICS</b>	<p><b>Chase Econometric Associates, Inc.</b></p> <ul style="list-style-type: none"><li>• Historical Data Bases<ul style="list-style-type: none"><li>U.S. Data Base</li><li>Business Conditions Digest Data Base</li><li>Financial Data Base</li><li>International Data Base</li><li>OECD Data Bases</li><li>Consumer and Wholesale Price Index Data Bases</li><li>Flow of Funds Data Base</li><li>Agricultural Data Base</li><li>Regional Macroeconomic and Industry Data Bases</li><li>Energy Data Base</li><li>Passenger Car Data Base</li><li>MarketScan US Data Base</li></ul></li><li>• Forecast Data Bases<ul style="list-style-type: none"><li>Short and Long Term Macroeconomic Forecasts</li><li>Financial Forecast</li><li>Inflation Planner Forecast</li><li>International and Foreign Exchange Forecasts</li><li>Japan Forecasts</li><li>Short Term Industry Forecasts</li><li>Agriculture and Fertilizer Forecasts</li><li>Insurance Forecasts</li><li>Regional Forecasts</li><li>Non-Ferrous Metals Forecasts</li><li>Long-Term Industry Forecasts</li><li>Steel Forecasts</li></ul></li><li>• Forecasting models are available to users. Several current reports on the U.S. statistical releases and commentaries on the economic outlook are also available.</li></ul>



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*Headquarters Address* : 486 Totten Pond Road, Waltham, MA 02154  
*Headquarters contact* : Manager, Product Development *Telephone No.:* (617) 890-1234

Subject	Description
ECONOMICS	<p><b>Midwest Econometrics, Inc.</b> Ohio Economic Data Base</p> <p><b>National Association of Home Builders</b> Short Term Regional Housing and Mortgage Model National, Regional and State Data Bases and Forecasts Online Report Services</p> <p><b>Regional Data Associates</b> State Housing/Mortgage/Demographic Long Run Model Historic and Forecast Data Bases Regional Online Report Services</p> <p><b>Ward's AutoInfobank sm</b> Automotive Data Base Delivery, Production, Inventory and Shipment data for the automotive industry Car and truck, heavy- and light-duty</p> <p><b>The Conference Board, Inc.</b> The Conference Board Data Base</p> <p><b>Metals Week</b> Historical series for all metals quoted by Metals Week</p>



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**Subject**

**Description**

**STOCK & BONDS**

***Prices/Split Dividend***

Daily prices, earnings, dividends and descriptive information. 42,000 corporate securities since 1968 and for 1.7 million municipal bonds since 1976. Exchange prices within 1/2 hour of market close. Theoretical options price data.

(Maintained by Interactive Data Services, Inc.)

***International Securities Data Base***

Daily prices, earnings, dividends, and descriptive information. 5000 United Kingdom securities since 1972. 9000 non-United Kingdom, non-United States securities since 1977. Includes equities, government and corporate bonds, Eurobonds, unit trusts, preferred capital, loanstocks, debentures.

(Maintained by Extel Computing, Limited)

***I/B/E/S Summary Statistics***

Earnings estimates for over 1,800 companies summarized by institutional brokerage firms. 24 data items since 1973.

(Maintained by Lynch, Jones & Ryan.)

**EXCHANGE RATES**

***Spot Rates***

Daily spot rates for 65 currencies since 1972.

(Maintained by Extel Computing, Limited)

**FINANCE**

***Value Line Data Bases***

Annual and quarterly financial, statistical, and ratio items. 1,700 major industrial, and financial companies since 1955. Five years of business line date for industrial companies.

(Maintained by Arnold Bernhard & Co., Inc.)

***COMPUSTAT Data Bases***

Annual and quarterly balance sheet, income statement and source and use of funds items. 3,500 industrial companies and 150 utilities. Twenty years of annual and ten years of quarterly data.

(Maintained by Standard & Poor's Corporation.)

***EXSTAT***

Financial statement data for 2000 European and Australian companies.

(Maintained by Extel Statistical Services, Limited.)

**BANKING**

***FDIC***

Annual and quarterly balance sheet and income statements for the past five years. Report of Condition and the Report of Income for insured banks.

(Maintained by Federal Deposit Insurance Corporation.)



*Company Name* : INSCO SYSTEMS

*Headquarters Address* : 3501 Route 66, Neptune, NJ 07753

*Headquarters contact* : John M. Tym

*Telephone No.:* (201) 922-5000

**Subject**

**Description**

**ECONOMICS**

***CITIBASE, Citibank Economic Data Base***

An annual U.S. Economic Time Series, produced on a monthly, quarterly, and annual basis. This covers more than 4000 time series extending back to 1947. The basic economic information is compiled from over 100 source documents of U.S. Government and private agencies. CITIBASE coverage includes data on finance, industries, population and labor force. National income and product accounts, and business conditions digest. When source agencies revise the data, concepts, or coverage, these changes are incorporated into CITIBASE. Each series, therefore, is accurate, consistent, and reliable.



*Company Name* : I.P. SHARP ASSOCIATES LIMITED  
*Headquarters Address* : 145 King Street West, Toronto, Ontario CANADA M5H 1J8  
*Headquarters contact* : David A. Keith *Telephone No.:* (416) 364-5361

Subject	Description
<b>AIRLINES</b>	<p><b>Form 41 Data Base</b></p> <p>This data is constructed from CAB Form 41 reports submitted to the Civil Aeronautics Board in Washington, D.C. by all U.S. Commercial air carriers and other official sources, on a monthly and quarterly basis. The data is comprised of balance sheet, expense, revenue and traffic statistics by aircraft type, type of service and by airport for over 60 carrier entities. In all, there are about one million time series associated with the data base.</p> <p><b>Origin-Destination Data Base</b></p> <p>The O&amp;D data base comprises the results of a survey performed by the CAB of the itineraries of 10% of all passengers travelling on commercial U.S. carriers. The data is retained on a quarterly basis from the first quarter of 1973 and is updated as soon as new tapes are available from the CAB.</p> <p><b>ER586 Data Base</b></p> <p>The "ER586 - Service Segment" data base consists of detailed monthly summaries of all activities across each of the flight segments flown by the certificated route air carriers. A flight segment is uniquely defined by five parameters: origin; destination; carrier; equipment type; and flight number. Approximately sixty facts are retained for each of these flight segments. The start date for the data base is January 1973 and it is updated within ninety days of the end of any reporting period. There are approximately 10 million time series in this data base.</p> <p><b>OAG - The Official Airline Guide Data Base *</b></p> <p>The OAG data base contains data supplied to I.P. Sharp Associates by The Reuben H. Donnelley Corporation of Chicago. The data for each month has both international and North American flight information and for each flight (some 200,000 each month), 21 items of information are retained. They include routes flown, service provided, flight times and equipment used. The data base is current with the OAG issues as published by The Reuben H. Donnelley Corporation and each month's information becomes available 9 days prior to the first of the month.</p> <p><b>INS - U.S. International Air Travel Statistics Data Base</b></p> <p>The INS data base contains data supplied to I.P. Sharp Associates by the U.S. Department of Transportation in cooperation with the Department of Justice, Immigration and Naturalization Service. The data base is comprised of monthly time series dating back to the beginning of 1975 and shows the number of passengers flying between U.S. and foreign ports. The data is broken down according to whether the passengers were U.S. citizens, whether the flight was commercial scheduled, commercial charter, or military, and by the flag of the carrier involved. To facilitate the analysis of traffic flows between large geographic areas, the use of world area codes is permitted.</p>



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**Subject****Description****AIRLINES*****T6 Air Charter Data Base***

The T6 data base has been created from CAB tapes supplied to Sharp by the National Archives and Records Services in Washington, D.C. This data base contains detail on all charter flights that fly within the U.S. or in/out of the U.S. For each city pair, carrier, charter type, equipment type, and leg type, data is available for the following facts: seats contracted, seats enplaned, cargo tons contracted, cargo tons enplaned, dollar revenue, and number of charter groups. Both U.S. and foreign air carriers (approximately 170 in all) are required to file this data.

**BANKING*****Bank of Canada Weekly Financial Statistics***

This data base contains weekly financial statistics as released by the Bank of Canada. The data base consists of 136 items. Aspects included are the Bank of Canada assets and liabilities, Government of Canada balances and securities outstanding, Money supply, Money market rates, Chartered Bank data and government bond yields.

***Chartered Banks Data Base (Monthly)***

This data base contains monthly data compiled by the Department of Finance and concerns the statement of 26 asset facts and 16 liability facts for the Chartered Banks of Canada. Data is updated monthly, and bank names and fact names are available in either English or French.

***Chartered Banks Data Base (Quarterly)***

This data base contains quarterly data compiled by the Financial Post and concerns the statement of revenue and expense, dividends and balance sheet items for the Chartered Banks of Canada. Bank names and fact names are available in either English or French.

***Chartered Banks Data Base (Annual)***

The Chartered Banks of Canada data base contains 87 balance sheet items as reported in the Bank's annual reports. The data is available from 1976 to the present.

**CORPORATIONS*****Fundamental Data Base \****

This data base contains the fundamental data taken from the annual reports of 241 major Canadian corporations. There are up to 81 facts per company per year available from 1959 to the present. The quarterly data bank consists of 18 items taken from quarterly reports. Currently, this data is held for approximately 80 Canadian companies and Chartered Banks.

**DEMOGRAPHY*****Census 71 Data Base***

This data base is produced from the Government of Canada's 1971 Census data base. It is detailed to the census tract level for the major municipalities in Canada.



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Subject	Description
<b>ECONOMICS</b>	<p><b>CANSIM** Mini Base and I.P. Sharp's CANSIM Mini Base Supplement</b>            The contents of the Statistics Canada CANSIM Mini Base are available through this data base. The data is a large collection of socio-economic time series relating to the internal activities and characteristics of Canada and to its external trade. The Mini Base contains over 24,000 time series of monthly, quarterly, or annual data, some dating from as early as 1914. Updates are on a daily basis.</p> <p>**CANSIM is the registered Trade Mark for Statistics Canada's machine-readable data base. When publishing any data retrieved from CANSIM, the following must be used as the source: "These data originate from CANSIM which is the registered Trade Mark for Statistics Canada's machine-readable data base."</p> <p><b>Consumer Price Indices</b>            The U.S. Consumer and Wholesale Price Index data bases contain data supplied to I.P. Sharp Associates on a monthly basis from the Bureau of Labor Statistics of the U.S. Department of Labor. All time series in these two data bases contain monthly data, some of it dating back to 1914 (e.g. the U.S. CPI for all items).</p> <p><b>Currency Data Base</b>            This data base contains exchange rates for a minimum of 24 currencies reported daily in four markets - New York, Toronto, London and Zurich. New York data extends back to 1972; Toronto and London data begins in 1977; and Zurich data begins in 1978.</p> <p><b>International Monetary Fund</b>            Over 24,000 time series are available on the international financial statistics gathered from approximately 215 countries. The aspects included are exchange rates, international liquidity, banking, interest rates, prices and production, commodities, national accounts, government spending, etc. The data is available monthly, quarterly, and annually and dates back for 10 to 20 years.</p> <p><b>NBER Data Base *</b>            The National Bureau of Economic Research (NBER) data base contains over 3,000 monthly, quarterly and yearly time series of information relating to the U.S. economy. The time series available include Financial Series, Industrial Series, Population, Labour Force, Employment, Earnings, National Income and Product Accounts, and Forecasts. This on-line information dates back to 1950 and is updated monthly.</p>

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Subject	Description
<b>ECONOMICS</b>	<p><b>NFS Data Base *</b></p> <p>The results of the large econometric model known as Candide, written by the Economic Council of Canada, contains some 2,500 time series of economic data, stretching from 1967 to the year 1985.</p> <p><b>UKCSO Data Base</b></p> <p>The UKCSO data base (United Kingdom Central Statistics Office) contains some 2,000 series covering a wide area of finance and economics relating to the United Kingdom. It is published by the U.K. Central Statistics Office who collect and consolidate data obtained from various parts of the civil service. The main areas covered by the data bank are industrial production, national income and expenditure, balance of payments, price, wages and earnings, and population and manpower.</p>
<b>ENERGY</b>	<p><b>PETRODATA</b></p> <p>PETRODATA contains data supplied to I.P. Sharp Associates by the U.S. Department of Energy (DOE) and by the American Petroleum Institute (API). Time series from these sources consist of statistics concerned with refinery input and output; stocks and imports of crude oil and finished petroleum products; and domestic crude oil production for various geographic regions in the United States. The Department of Energy data obtained from tables published in the monthly "Petroleum Statement" of their Mineral Industry Surveys is available back to the beginning of 1972 in most cases. In general, the data is available about 5 months after the end of the reporting period. Data published by the American Petroleum Institute in their "Weekly Statistical Bulletin" is also stored. It is updated weekly and is available back to January 1976.</p>
<b>ENVIRONMENT</b>	<p><b>NEELS</b></p> <p>The National Emergency Equipment Locator System (NEELS) data base contains information needed to locate the required equipment and materials in the event of an environmental emergency such as an oil spill. (Maintained by Environment Canada.)</p>



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Subject	Description
INSURANCE	<p><b>Actuarial Data Base</b></p> <p>The Actuarial Data Base is currently comprised of primitive mortality information on insured lives, annuitants, and the general population, taken from over 100 published tables. In addition, there is a supply of projection and salary scales, as well as rates of withdrawal, disability and remarriage.</p>
SECURITIES	<p><b>Stock Exchange *</b></p> <p>The daily stock exchange data from all the Canadian, New York and American exchanges are retained daily for the past 260 trading days. After that, the Canadian data is kept on a weekly basis. Included are the New York Composite Indices, and the 62 Indices that make up the Toronto Stock Exchange 300.</p> <p><b>Canadian Stock Options *</b></p> <p>The Stock Options data base consists of daily trading data for call options traded on the Toronto, Montreal and Trans Canada exchanges. Data items available are high, low, close, volume, open interest, bid, ask and dollar value traded. Historical data is available for the past 260 trading days.</p> <p>* For costs associated with these data bases please contact your local Sharp representative.</p>



*Company Name* : MJK ASSOCIATES  
*Headquarters Address* : 2343B Homestead Road, Santa Clara, CA 95050  
*Headquarters contact* : Michael A. Marriott *Telephone No.:* (408) 247-5102

**Subject**

**Description**

**COMMODITIES**

***Commodity Data Information Service***

Daily contract and cash prices for major commodities and currencies. Each day's price data and previous day's volume and open interest are updated by 2:15 Pacific Time. The online data base extends back to 1970.



*Company Name* : ON-LINE SYSTEMS, INC.

*Headquarters Address* : 115 Evergreen Heights Drive, Pittsburgh, PA 15229

*Headquarters contact* : W. Nemanick

*Telephone No.:* (412) 931-7600

**Subject**

**Description**

**MARKETING**

***Market Statistics Data Base***

The On-Line Systems Market Statistics Data Base provides the user with 108 demographic, social, and economic factors for every county in the United States. The data base also provides this information according to the 300 metropolitan composites, the Arbitron grouping of counties (ADI), and the Nielsen grouping of counties (DMA). The data is updated annually.

These population, income, and retail statistics are a valuable tool for sales management, product management, advertising researchers, and market analyzers. The data can be used to effectively define:

- Media budgets
- Test markets
- Long-range projections
- Potential markets
- Sales quotas

By answering a few simple questions, the user can access any information in the data base. Once the data has been accessed, it can be plotted by using OLSGDS, On-Line's Graph Design System. The user can manipulate the data by creating a file with OLIVER, On-Line's information retrieval and data base management system.

(Maintained by Market Statistics.)

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**Subject**
**Description**
**STOCKS & BONDS**
**OASES**

OASES is a securities data base system that contains current and historical trading, financial, and descriptive information for over 30,000 security issues of all types. This data is updated daily, checked for potential errors, and is carefully maintained to assure the highest level of data integrity. OASES is broad-based in scope, efficient in operation, and economical to use. In addition, it is flexible and easy to use in many diverse applications.

OASES can assist money managers, investment advisors, accountants, and others who require an easy and rapid access to securities information. Bank trust departments, investment management services, brokerage firms, insurance companies, corporate trust operations, and CPA firms are some of the types of organizations that can make effective use of the OASES system.

The OASES securities library covers three main areas:

- MASTER information that consists of descriptive and status information, and current fundamental data for all securities.
- PRICE information that consists of a 2 1/2 year history of daily volume, high, low, and closing prices (or bid-ask prices).
- DIVIDEND information that consists of a 2 1/2 year history of dividend and stock distribution statistics for equity issues, and bond interest payment data for debt issues.

OASES data can be retrieved through the use of stand-alone applications programs, FORTRAN subroutines, and OLIVER, On-Line's information retrieval and data base management system. The stand-alone programs allow the user to retrieve and manipulate the data and create graphs. OASES can be interfaced with OLSFMS, On-Line's Financial Modeling System.

The PORT program, which utilizes the data base, is a portfolio valuation and reporting system with the capability of easily providing a wide variety of customized report formats. The PERVAL system is designed to monitor any type of security portfolio by accomplishing performance measurements and analysis. In addition, detailed transaction journals, brokerage reports, valuation reports, audit and discrepancy reports, purchase/sale reports, and ERISA compliance documentation may be provided.

Source — Telstat, Inc.  
 (Maintained by Capital Market Systems.)



*Company Name* : RAPIDATA, INC.  
*Headquarters Address* : 20 New Dutch Lane, Fairfield, NJ 07006  
*Headquarters contact* : Richard Schroeder, Mktg. Mgr. *Telephone No.:* (201) 227-0035

Subject	Description
ECONOMICS	<p><b>Citibank Economic Database</b></p> <p>Over 2500 financial, industrial, population, national and personal income, government receipts and expenditures, savings and investment, corporate profits, and price deflator information. The data base also includes economic forecasts for selected variables, wholesale price indices and the Business Condition Digest data base.</p> <p>(Maintained by the Economic Data Base staff of Citibank)</p>
ECONOMICS	<p><b>International Financial Statistics</b></p> <p>Monthly, quarterly and annual economic data on over 150 countries, regions and the world, including series on national income, international reserves, currency exchange rates, governmental and private debt, imports and exports.</p> <p>(Maintained by the International Monetary Fund)</p>
ECONOMICS	<p><b>Balance of Payments</b></p> <p>Over 16,000 quarterly and annual balance of payments time series on over 80 countries.</p> <p>(maintained by the International Monetary Fund)</p>
FINANCE	<p><b>Telerate</b></p> <p>Over 9000 financial time series, including daily and weekly rates on domestic bond yields, corporate and mortgage debt instruments, domestic and foreign money market rates, Euro-dollar and Eurocurrency rates and foreign exchange rates, Federal Reserve statistics on factors affecting member bank reserves, assets and liabilities of large commercial banks and flow of funds accounts. Thrift industry statistics including mortgage holdings, transactions and ownerships of mortgage instruments. U.S. Treasury data on the level and composition of outstanding debt, operating balances and ownership of treasury issues.</p> <p>(Maintained by Rapidata using data supplied by Telerate and the Federal Reserve Bank)</p>





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*Headquarters Address* : 20 New Dutch Lane, Fairfield, NJ 07006  
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Subject	Description
FINANCE	<p><b>Rapidquote</b></p> <p>Daily and weekly security price and volume data for over 14,000 securities on all major stock and bond exchanges, over-the-counter stocks, and options exchanges. In addition, the data base includes earnings, dividends, split, yield, and other information on each security. (Maintained by Rapidata using data supplied by Telstat, Inc.)</p>
FINANCE	<p><b>Federal Reserve Bank of San Francisco</b></p> <p>Over 9000 weekly, monthly and quarterly financial, industrial, employment, and national income economic time series. (Maintained by the Federal Reserve Bank of San Francisco)</p>
MARKETING	<p><b>Market Statistics</b></p> <p>Over 100 demographic (population, personal income, buying power, etc.) and retail sales data items for each of the 3100 U.S. counties plus corresponding data aggregated to the state, metro, ADI and DMA level. (Maintained by Market Statistics, Inc.)</p>



*Company Name* : SCIENTIFIC TIME SHARING CORPORATION  
*Headquarters Address* : 7316 Wisconsin Avenue, Bethesda, MD 20014  
*Headquarters contact* : Paul A. Tava *Telephone No.:* (914) 428-6910

Subject	Description
ECONOMICS	<p><b>CITIBASE (NBER)</b> Scientific Time Sharing Corporation (STSC) offers interactive access to the Citibank Economic Database (formerly maintained by the National Bureau of Economic Research) which contains over 3800 time series for the U.S. economy from as early as 1947.</p> <p>The data series are retrieved within a standard STSC time series module which includes numerous display, manipulative, statistical and plotting programs (APL). Extensive on-line documentation (including a directory of codes) is also available.</p>
ECONOMICS	<p><b>INTERNATIONAL FINANCIAL STATISTICS DATABASE (IFS)</b> Scientific Time Sharing Corporation offers interactive access to the International Financial Statistics Database (provided by the International Monetary Fund) which contains over 16,000 economic time series for 135 countries from as early as 1948. The database includes information on exchange rates, international liquidity, money and banking, prices, production and international trade, balance of payments, and national accounts.</p> <p>The data series are retrieved within a standard STSC time series module which contains numerous display, manipulative, statistical and plotting programs (APL). Extensive on-line documentation (including a directory of countries and codes) is also available.</p>



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*Headquarters contact* : Mr. Bill Burgess *Telephone No.:* (213) 829-7511

**Subject**

**Description**

**BUSINESS**

**ACCOUNTANT'S INDEX**

Provides access to the literature related to accounting, auditing, taxation, data processing, investments, financial management, financial reporting, and management. The coverage is international in scope including English-language books, speeches, pamphlets, government documents and journals. (Prepared by American Institute of Certified Public Accountants.)

**AGRICULTURE**

**AGRICOLA**

Covers worldwide journal and monographic literature in agriculture and related subject fields, including general agriculture and rural sociology; economics; consumer protection and human nutrition; animal science; veterinary medicine; forestry and plant-related areas; chemistry; natural resources; entomology; and agricultural engineering. (Prepared by U.S. National Agricultural Library.)

**ENERGY**

**APILIT**

Coverage of worldwide refining literature. Includes petroleum refining, petrochemicals, air and water conservation, transportation and storage, and petroleum substitutes. (Prepared by Central Abstracting and Indexing Service of the American Petroleum Institute.)

**PATENTS**

**APIPAT**

Citations to refining patents, both U.S. and non-U.S., in the same subject areas covered by APILIT. (Prepared by the Central Abstracting and Indexing Service of the American Petroleum Institute.)

**STATISTICAL  
INDEX**

**AMERICAN STATISTICS INDEX**

American Statistics Index, covering statistical publications of the U.S. Government: periodicals, annuals, biennials, surveys, analytical reports, statistical compilations...Subject coverage is as broad as the Government's national and international interest. (Prepared by Congressional Information Service, Inc.)

**BIOLOGY**

**BIOCODES**

Contains BIOSIS PREVIEWS Category Codes, Taxonomic Codes, and their full names as well as cross references. The file can be helpful in selecting terminology for any life sciences search, and is specifically tailored for on-line determination of relevant BIOSIS codes. (Prepared from data supplied by Bioscience Information Service.)



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Subject	Description
BIOLOGY	<p><b>BIOSIS AND BIO6973</b></p> <p>Includes contents of <i>Biological Abstracts</i> (BA) and <i>BioResearch Index</i> (Biol) covering the entire life sciences. Literature selected must meet one of the following selection criteria: original research reports in biological and biomedical fields, reviews of original research in biology, history and philosophy of the biological and biomedical sciences, or documentation and retrieval of biological and biomedical information. Citations are taken from approximately 8,000 serial publications as well as books, notes, research communications and symposia.</p>
SCIENCE	<p><b>CAMBRIDGE SCIENTIFIC ABSTRACTS GROUP</b></p> <p>Covering a broad range of the world's scientific technical literature, the Cambridge Scientific Abstracts Group will be offered by SDC Search Service in two on-line files. One file contains <i>Electronics &amp; Communications Abstracts</i>, <i>Computer &amp; Information Systems Abstracts</i>, <i>Solid State Abstracts</i>, and <i>Science Research Abstracts</i> (includes superconductivity research, MHD and plasmas, theoretical physics, laser &amp; electro-optic reviews, and quantum electronics). <i>Safety Science Abstracts</i>, the first of these files to be available in 1978, includes the science of safety, covering events of phenomena which threaten mankind, his environment or technology. Citations for these data bases are gathered from book reviews, financial news, government affairs, new product news, and patents.</p>
CHEMISTRY	<p><b>CAS77</b></p> <p>Chemical Abstracts Condensates, covering biochemistry, organic chemistry, macromolecular chemistry, applied chemistry and chemical engineering, and physical and analytical chemistry, with special searching features including the merger of Chemical Abstracts Subject Index Alert registry numbers and volume index entries. Covers the 1977 and 1978 literature. (Prepared by Chemical Abstracts Service.)</p>
CHEMISTRY	<p><b>CAS7276</b></p> <p>Provides the same coverage as CAS77 for literature published from 1972 through 1976.</p>

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**Subject**
**Description**
**BUSINESS**
**CANADIAN BUSINESS PERIODICALS INDEX**

Includes a broad range of topics under the heading of industry in the Canadian environment including Canadian and international political developments, technical development, biographical and career information, corporate events, annual meetings, financial reports, new product announcements, labor events, and articles of opinion on corporate securities. References are drawn from approximately 150 Canadian English language periodicals including *Canadian Grocer*, *Globe and Mail* and *Financial Post*. Corresponds in coverage to *Canadian Business Periodicals Index*. (Prepared by Information Access of Toronto, Canada.)

**MULTI-DISCIPLINARY**
**COMPREHENSIVE DISSERTATION INDEX**

Contains all dissertations accepted for academic doctoral degrees granted by U.S. educational institutions and some non-U.S. universities. Materials stem from two printed products: *Dissertation Abstracts International* (for which full text copies are available from UMI) and *American Doctoral Dissertations*. (Prepared by University Microfilms International.)

**CHEMISTRY**
**CHEMCON (Replaced by CAS77 and CAS7276)**
**CHEMISTRY**
**CHEM7071 (Replaced by CAS77 and CAS7276)**
**CHEMISTRY**
**CHEMDEX**

This is a compound oriented chemical dictionary file that covers all compounds cited in the literature from 1972 to date. It may be searched by chemical name or fragment, by molecular formula or molecular formula fragment, or by group or row within the periodic chart. Each record contains a Registry Number, the molecular formula and Chemical Abstract's rigorous nomenclature for a specific compound. The Registry Numbers retrieved in CHEMDEX may be used as search terms in the CAS77 and CAS7276 data bases for comprehensive retrieval of the chemical literature. (Prepared by Chemical Abstracts Service.)

**CHEMISTRY**
**CHEMICAL INDUSTRY NOTES**

Contains citations to the business literature in the chemical industry, including production, pricing, sales, facilities, products and processes, corporate activities, government activities, and people. Covers over 80 periodicals. (Prepared by Chemical Abstracts Service.)

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Subject	Description
<b>GOVERNMENT &amp; MULTI-DISCIPLINARY</b>	<b>CONGRESSIONAL INFORMATION SERVICE INDEX</b> Covers U.S. Congress publications; hearings, committee prints; House and Senate Reports; Documents, and special publications; Senate Executive Reports and Documents. Subject coverage is multi-disciplinary and topical. (Prepared by Congressional Information Service, Inc.)
<b>BUSINESS</b>	<b>CANADIAN NEWS INDEX</b> A comprehensive index to the events and people making the news in Canada. Subject areas covered include international news, national news, provincial affairs, editorials, government activities, labor news, reviews of books, arts, radio and television. References are gathered from <i>Montreal Star</i> , <i>Toronto Globe and Mail</i> , <i>Toronto Star</i> , <i>Vancouver Sun</i> , and <i>Winnipeg Free Press</i> . (Prepared by Information Access, Toronto, Canada.)
<b>SCIENCE</b>	<b>COLD REGIONS</b> Contains complete coverage of cold regions science and technology. Topics covered include navigation in ice, snow, ice and frozen ground, civil engineering in cold regions, behavior and operations of materials and equipment in cold temperature. Geographic areas covered include the Arctic, Antarctic and Subarctic islands. (Prepared by Core of Engineers, U.S. Army, Cold Regions Research & Engineering Laboratory.)
<b>ENGINEERING</b>	<b>COMPENDEX</b> Corresponds to Engineering Index Monthly. Covers civil, environmental, geological engineering; mining, metals, petroleum, fuel engineering; mechanical, automotive, nuclear aero-space engineering; electrical, electronics, control engineering; chemical agricultural food engineering; and industrial engineering, management, mathematics, physics, and instruments. (Prepared by Engineering Index, Inc.)
<b>MULTI-DISCIPLINARY</b>	<b>CONFERENCE PAPERS INDEX</b> Contains references to scientific and technical papers presented at approximately 1,000 regional, national, and international meetings. By citing programs of meetings rather than formal journal literature, Conference Papers Index offers access to new R and D reports often as much as a year before they are published. (Prepared by Data Courier, Inc.)





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**Subject****Description****GOVERNMENT****CRECORD**

Provides comprehensive, highly current coverage of the activities on the floor of Congress. Beginning with the second session of the 94th Congress. Beginning the data base contains capsules of the *Congressional Record* indexed and cross-referenced in 275 legislative areas.  
(Prepared by Capitol Services, Inc.)

**ENERGY****ENERGYLINE**

Comprehensive coverage of over 200 core journals and selected coverage of several thousand other journals, as well as reports and surveys monographs, and newspaper articles. Subject-area coverage includes energy economics, U.S. policy and planning, research and development, resources and reserves, environmental impact, electric power transmission and storage, and fuel transport and storage.  
(Prepared by Environment Information Center, Inc.)

**ENVIRONMENT****ENVIROLINE**

Contains citations on all areas of environmental studies. Subject areas covered include air pollution, chemical and biological contamination, energy, environmental education, environmental design and urban ecology, food and drugs, international affairs, land use, non-renewable resources, oceans and estuaries, population planning, geophysical change, and wildlife. References are gathered primarily from English language journals, as well as government reports and documents, monographs, and conference papers.  
(Prepared by Environment Information Center, Inc.)

**EDUCATION****ERIC**

Covers report and periodical literature in many education and education-related areas: counseling and personnel services; career education; early childhood education; educational management; exceptional children; information resources; languages and linguistics; reading and communications; rural education; environmental education; teacher education; and test, measurement, and evaluation.  
(Prepared under funding by the U.S. National Institute of Education.)

**MULTI-DISCIPLINARY  
GOVERNMENT****FEDERAL REGISTER**

Corresponds in coverage to *Federal Register Abstracts*, and contains citations gathered daily from the *Federal Register*. Subjects covered include agriculture, arts/humanities, athletics, business, constitutional rights, consumer affairs, contracts, defense, environment, foreign affairs, law enforcement, parks/recreation, taxation, technology, trade, transportation, and veterans' affairs. Items included are Rules, Proposed Rules, and Public Law Notices, etc.  
(Prepared by Capitol Services, Inc.)



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Subject	Description
<b>INDUSTRY &amp; SCIENCE</b>	<b>FOOD SCIENCE AND TECHNOLOGY</b> Corresponds to the printed <i>Food Science and Technology Abstracts</i> . Covers the literature related to all human food commodities and aspects of food processing, except the production of raw foods. Subject areas covered include basic food science; microbiology; hygiene and toxicology; food economics and statistics; food engineering; food packaging; commodity techniques; alcoholic and non-alcoholic beverages; fruits, vegetables and nuts; fish and marine products; food additives; spices and condiments; and food laws, regulations and standards. References are gathered worldwide from patents, books, standards, and journal articles. (Prepared by the International Food Information Service.)
<b>SCIENCE</b>	<b>GEOREF</b> Geological Reference file, covering geosciences literature from 3000 journals, plus conferences and major symposia and monographs, in such areas as areal geology, economic geology, engineering-environment geology, geochemistry, geochronology, geomorphology, igneous and metamorphic petrology, solid earth geophysics, and stratigraphy. (Prepared by the American Geological Institute.)
<b>GRANTS</b>	<b>GRANTS</b> Is complete single source reference to more than 1500 grant programs offered by federal, state and local governments, commercial organizations, associations and private foundations in over 88 disciplines, including adult education, agriculture, social sciences, fine arts, architecture, natural sciences, banking and business, health sciences, and law. (Prepared by Oryx Press.)
<b>BUSINESS</b>	<b>INFORM</b> Covers business management periodical literature from over 300 journals, in the areas of finance, management, economics, statistics, business law, and marketing. Journal such as <i>Duns Review</i> , <i>Harvard Business Review</i> , and <i>Nations Business</i> are abstracted. (Prepared by ABI, a division of Data Courier, Inc.)
<b>SCIENCE</b>	<b>INSPEC</b> Provides worldwide coverage of the literature in physics, electrical and electronics engineering, and computer technology. Source documents are primarily journal articles; however, government reports, patents, and monographs are included. Corresponds in coverage to <i>Physics Abstracts</i> , <i>Electrical &amp; Electronics Abstracts</i> , and <i>Computer &amp; Control Abstracts</i> . (Prepared by the Institution of Electrical Engineers.)

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Subject	Description
<b>ENGINEERING</b>	<b>ISMEC</b> Covers mechanical engineering, production engineering, and engineering management. Subjects covered include production processes, tools and equipment, energy and power, transport and handling, management and production, measurement and control, and mechanics, materials and devices. References are gathered from journal articles, technical reports, conference proceedings, and books. (Prepared by Data Courier, Inc.)
<b>SOCIAL SCIENCE &amp; ECONOMICS &amp; INDUSTRY</b>	<b>LABORDOC</b> Coverage includes the fields of industrial relations, economic and social development, management, social security, human rights, chemical industry, electrical industry, hotel industry, public finance, taxation, occupational safety, labor mobility, and vocational training. Citations are drawn from the International Labour Organization's major publications, books, selected periodical articles, conference reports, and technical documents. (Prepared by the International Labour Organization.)
<b>MULTI-DISCIPLINARY</b>	<b>LIBCON</b> Covers English- and non-English-language materials in all subject areas of the monographic literature and audiovisual materials and includes MARC records from the Library of Congress as well as many more LC-cataloged items.
<b>SOCIAL SCIENCE</b>	<b>LISA</b> Based on the printed <i>Library &amp; Information Science Abstracts</i> , provides worldwide coverage of the field of library and information science, including technical processes and services; promotion of use of libraries and library materials; organization and administration; library stock and materials; use of libraries and library materials; institutional libraries; librarianship; publishing; bookselling; reading; and reprography. References are gathered from primary materials in over 20 languages from 300 periodicals, papers in conference proceedings, books and reports. (Prepared by the Library Association, England.)
<b>BUSINESS</b>	<b>MANAGEMENT</b> Provides extensive coverage of the business literature gathered from both U.S. and non-U.S. journals, proceedings, and transactions. Content coverage includes accounting, banking, commodities and goods, economics, finance, government regulations, human resource development, industrial relations, management, marketing, production, professions, public administration and government, social issues, systems and controls, and industry-specific literature. (Prepared by Management Information Services.)



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Subject	Description
<b>NEWS</b>	<b>NEWSPAPER INDEX</b> Covers events, people and places in the news since 1976. An on-line index to major national and international events, Newspaper Index provides complete coverage of seven major U.S. newspapers: the Washington Post, the Los Angeles Times, San Francisco Chronicle, Chicago Tribune, Detroit News, Houston Post, and New Orleans Times Picayune. (Prepared by Bell and Howell.)
<b>MULTI-DISCIPLINARY</b>	<b>NTIS</b> Is a broad and cross-disciplinary file containing citations and abstracts of government-sponsored R&D reports and other government analyses prepared by Federal agencies or their contractors and grantees. Corresponds to the <i>Weekly Government Abstracts</i> and the semimonthly <i>Government Reports Announcements</i> . (Prepared by National Technical Information Service (NTIS) of the U.S. Department of Commerce.)
<b>INDUSTRY &amp; SCIENCE</b>	<b>PAPERCHEM</b> Covers the scientific and technical literature, including patents, of the pulp-paper-, and board-manufacturing and utilizing industries gathered from all industrialized countries. Over 1000 periodicals screened regularly. (Prepared by the Institute of Paper Chemistry.)
<b>ENERGY &amp; BUSINESS &amp; NEWS</b>	<b>P/E NEWS</b> Covers five major publications in the petroleum and energy fields: <i>Platts Oilgram News Service</i> , <i>Middle East Economic Survey</i> , <i>Petroleum Intelligence Weekly</i> , <i>Petroleum Economist</i> , and <i>Oil Daily</i> . (Prepared by Central Abstracting and Indexing Service of the American Petroleum Institute.)
<b>MEDICAL</b>	<b>PHARMACEUTICAL NEWS INDEX</b> Covers items from seven weekly publications: Drug Research Reports ("The Blue Sheet"); FDC Reports ("The Pink Sheet"); Medical Devices & Instrumentation Report ("The Grey Sheet"); Quality Control Report ("The Gold Sheet"); Weekly Pharmacy Report ("The Green Sheet"); the PMA Newsletter; and the Washington Drug and Device Letter. Coverage includes major health bills; individual company's sales and earnings analyses; FDA recalls and court actions; NDA approvals; legislative actions; Federal Register notices and hearings, etc. (Prepared by Data Courier, Inc.)

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Subject	Description
<b>ENERGY &amp; ENVIRONMENT &amp; SCIENCE</b>	<b>POLLUTION</b> Correspondences in coverage to the printed Pollution Abstracts publication. Covers non-U.S. and domestic reports, journals, contracts and patents, symposia, and government documents in the areas of pollution control and research: water, marine, land, and thermal pollution; pesticides; sewage and waste treatments; and legal developments. (Prepared by Pollution Abstracts, Data Courier, Inc.)
<b>BUSINESS STATISTICAL INDEX</b>	<b>PROMPT</b> Covers citations on new products, acquisitions, capacities, end-uses, market data, technology, production, environment, foreign trade, countries and regulations for the extractive, manufacturing, transportation, utilities and other industries from journals, studies and prospectuses gathered worldwide. Sales and income by product line or division from corporate annual reports are also included. (Prepared by Predicasts Inc.)
<b>SOCIAL SCIENCE</b>	<b>PSYCH ABS</b> Worldwide coverage of psychology and other behavioral sciences primarily from the journal literature. Includes major subject areas such as, Psychometrics and Statistics, Perception and Motor Performance, Cognitive Processes and Motivation, Neurology and Physiology, Psychopharmacology and Physiological Intervention, Animal Psychology, Developmental Psychology, Cultural Influences and Social Issues, Communication and Language, Personality, Physical and Psychological Disorders, Treatment and Prevention, Education Psychology and Applied Psychology. Corresponds in coverage with the printed <i>Psychological Abstracts</i> . (Prepared by American Psychological Association, Inc.)
<b>NEWS</b>	<b>QUEBEC-ACTUALITE</b> An entirely foreign-language file, with all citations in French. Contains citations and abstracts concerning local, regional, national and international current events from three Quebec newspapers: Le Devoir, La Presse, and Le Soleil. Coverage includes editorials, columns, letters, reviews, news reports, analyses of political events, business and financial developments, legislation, and personalities in the news, including politicians, directors, and executives of companies. Corresponds to Index de l'actualite.



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Subject	Description
SCIENCE & MEDICAL	<p><b>RINGDOC</b></p> <p>Covers over 400 of the world's scientific journals to provide extensive coverage of the pharmaceutical literature. Access points to the citations include keywords and multipunch coded data (representing chemical fragments).</p> <p>(Prepared by Derwent Publications, Ltd. Available to subscribers only.)</p>
TRANSPORTATION	<p><b>SAE ABSTRACTS</b></p> <p>Covers papers concerned with self-propelled vehicles and applicable to the aerospace, transportation, and automotive industries. Indexed with subject terms from the Thesaurus of Engineering and Scientific Terms published by the Engineering Joint Council.</p> <p>(Prepared by the Society of Automotive Engineers, Inc.)</p>
MULTI-DISCIPLINARY	<p><b>SSIE</b></p> <p>Covers on-going and recently completed research in the life, physical and social sciences—both basic and applied research projects. Research in progress is included from over 1300 funding organizations, such as Federal, state, and local government; non-profit associations; colleges and universities; nonaffiliated investigators; and some non-U.S. organizations and private industry.</p> <p>(Prepared by the Smithsonian Science Information Exchange.)</p>
SCIENCE & INDUSTRY	<p><b>TITUS</b></p> <p>A comprehensive file of information related to the textile industry, designed to be useful to textile managers, engineers, and technicians. Citations are gathered from more than 800 periodicals, technical reports, patents, standards, scientific theses, manufacturers, technical data-sheets, conference reports, and legal and administrative regulations. Subject coverage includes fibres, bonding, analysis, agents, ploymerization, properties, testing, treatments, weave, and chemical composition.</p> <p>(Prepared by Institu Textile de France.)</p>



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**Subject**

**Description**

**ENERGY &  
ENVIRONMENT &  
ENGINEERING**

**TULSA**

Covers oil and gas exploration, development, and production in such areas as petroleum geology, exploration geophysics and geochemistry; well drilling; well logging; well completion and servicing; oil and gas production; reservoir studies and recovery methods; pollution; alternative fuels and energy sources; and petroleum transportation and storage.

(Prepared by the Information Services Department of the University of Tulsa.)

**GOVERNMENT  
SOCIAL SCIENCE**

**U.S. POLITICAL SCIENCE DOCUMENTS**

Offers thorough coverage of journal articles in U.S. published political science journals that have been selected for their importance by scholars in the field. Topics covered include foreign affairs and international relations, defence and strategic studies, "area" studies (e.g., Latin America, Africa, Middle East), urban and governmental affairs, voting, power, and authority. (Prepared by the University of Pittsburg.)

**PATENTS**

**WPI**

Comprehensive and authoritative World Patent Index file. For some sections, e.g., Farmdoc, coverage dates back to 1963. Multiple access points include patentee codes, Derwent classes, title terms, IPC's priorities, patent numbers, and special Derwent indexing features such as manual codes and multipunch coded data.

(Prepared by Derwent Publications, Ltd. Available to subscribers only.)





*Company Name* : THE SERVICE BUREAU COMPANY  
*Headquarters Address* : 500 West Putnam Avenue, Greenwich, CT 06830  
*Headquarters contact* : William J. Flynn *Telephone No.:* (203) 622-2293

Subject	Description
<b>BANKING</b>	<p><b>BANKANAL</b> A forecasting and comparative analysis system supplied by the Robinson-Humphrey Company, Atlanta, Georgia, coupled with a data base of financial information. The data base consists of annual data, mostly 1969 through 1977, for over 125 banks, and quarterly data, mostly first quarter 1974 through fourth quarter 1977, for more than 20 banks. Each bank contains over 100 data items for each period.</p> <p><b>EURABANK</b> A data base supplied by the European American Bank containing annual financial information taken from the annual reports of over 1000 non-U.S. Banks. Included in EURABANK are the top 500 banks outside the United States as well as representative banks from financial centers world wide with up to four years of historical data on each bank. The data base is updated continually as the data becomes available.</p> <p><b>FDIC</b> A data base consisting of balance sheet, income statements and summary of deposit statement from the over 14,000 Federal Deposit Insurance Corporation (FDIC) member banks.</p> <p><b>FSLIC</b> A data base, supplied by the Federal Home Loan Bank Board (FHLBB), consisting of balance sheet, income statement and summary of deposit statement information for 4500 federally insured savings and loan associations in addition to deposit balance data for individual association offices.</p>
<b>MULTI-DISCIPLINARY</b>	<p><b>COMPUSTAT</b> A data base supplied by Standard &amp; Poor's Compustat Services, Inc. consisting of quarterly and annual financial and stock market data for 10 years (quarterly) and 20 years (annual) on over 4000 companies. Additional files with annual and quarterly data are available on some 115 leading U.S. banks and bank holding companies and on some 155 Class A gas and electric utilities. Each file has from 26 to 222 data items obtained from the company's income statement, balance sheet, statement of changes in financial position, and other key statements.</p>

*Jim Campbell*





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**Subject**

**Description**

**GOVERNMENT GRANTS**

**FAPRS**

A data base supplied by the Office of Management and Budget consisting of information on more than 1000 federal domestic assistance loans, grants and federal assistance programs. The data base is divided into eight categories which are: 1) Community Facilities, 2) Business and Industrial Development, 3) Planning and Technical Assistance, 4) Housing, 5) Education, 6) Employment, 7) Health, and 8) Social Services.

**ECONOMICS**

**DRI Capsule Data Base**

A time-series data base provided by Data Resources, Inc. consisting of monthly, quarterly, and annual economic data from 1947 to present. The data base is updated daily and contains more than 3300 time series selected from U.S. Government publications and many private sources.

**CONSTRUCTION**

**ORR System**

A construction cost estimating system, supplied by Cost Systems Engineers, Inc., Fort Worth, Texas, comprising five major data bases. It utilizes an extensive historical data base to provide accurate estimates of the cost to construct through all levels of conceptualization, budgeting, design and construction. The data base contains over 2,000 completed projects valued at \$7 billion, retrievable by project type, and detailed cost information on over 50,000 cost items. The system works with both English and metric measures and can present estimates in any currency.

**STOCKS & BONDS**

**EARLYOPT**

A data base supplied by Monchik-Weber Associates, Inc. consisting of information on options traded on all 5 option markets (CBOE, AMEX, Philadelphia, Pacific and Midwest Exchanges), current plus 5 days of history for option closing price, option volume, option open interest as well as information on all call and put options and current information on the options underlying stock.

**MISTI**

A securities data base, supplied by TELSTAT SYSTEMS, INC. containing both current and historical financial information, which is updated daily, for over 30,000 different securities listed on all the major exchanges.



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Subject	Description
STOCKS & BONDS	<p><b>MUNIPRICE</b></p> <p>A set of pricing programs and a data base provided by Telstat Advisory Systems, a subsidiary of TELSTAT SYSTEMS, INC., which contains information on over 1,500,000 issues placed by more than 34,000 municipal bond issuers.</p> <p><b>VALPORT</b></p> <p>A data base containing price, earnings, dividend and other statistical information on over 31,000 securities. This data base, which is updated daily, includes recent daily price history and monthly closing prices the previous year. Over 50,000,000 characters of information are available on a randomly accessed basis for statistical research and automatic portfolio valuation. (VALPORT is a Registered Service Mark of F. C. Towers, Bethesda, Maryland.)</p>
DEMOGRAPHIC	<p><b>SITE II</b></p> <p>A comprehensive demographic data base and access package supplied by C.A.C.I., Washington, D.C. SITE II contains information on over 200 million people including age, sex, income, occupation, education level, home value, and personal property. Updated information is provided on population, number of households and per capita income. Data can be accessed with respect to geographic or geometric areas. A companion system — LOCATE — exists for calculation of longitude and latitude points of geometric areas. Six standard reports are provided; Columnar, Comparison, Component, Growth, Profile and Summary. An output data file can be obtained from SITE II to be linked to other SBC products.</p>
INSURANCE	<p><b>Life Rates Data Base</b></p> <p>A data base supplied by the National Underwriter Company containing premium, cash value, dividend, and other information for life insurance policies. More than 2500 policies from more than 250 American and Canadian insurance companies may be accessed and analyzed using a built-in report generation system.</p>



*Company Name* : VALUE LINE DATA SERVICES  
*Headquarters Address* : 711 Third Avenue, New York, NY 10017  
*Headquarters contact* : William C. Close *Telephone No.:* (212) 687-3965

**Subject**

**Description**

**FINANCE**

***The Value Line Data Base***

One of the world's largest financial data bases. Contains more than 70 million characters of reported and restated annual and quarterly financial records for over 1600 companies and more than 80 industry composites. Fully 400 annual, quarterly, estimated and calculated data items are provided in unified data arrays that eliminate the need to access more than one data file.

Contains annual data to 1955, quarterly data since 1963, restated sales and earnings by product line for 4 years, earnings and dividend forecasts for the coming year plus 3- to 5-year projections. Includes complete income statements, balance sheets, sources and uses of funds.

Special features: numerical coding of accounting practices plus identification of industries and markets served; replacement cost accounting data; statistical measures of earnings predictability and stability; stock price betas and standard deviations; industry-specific data; about 80 industry financial composites; a 900-company composite of financial data for industrial companies; historic growth rates and rates of return; detailed per share data.

Also contains stock prices: the recent quotation, monthly highs and lows, average annual, average quarterly and quarter-ending stock prices. All data are fully adjusted for stock splits and stock dividends.

Subscription plans:	Annual,	\$5000;
	3-Month	\$1500;
	University,	\$1000;
	Per Access,	7¢

Available: major time-sharing companies and/or via magnetic tape.

*Company Name* : WARNER COMPUTER SYSTEMS, INC.  
*Headquarters Address* : 605 Third Avenue, New York, NY 10016  
*Headquarters contact* : Mark Owades *Telephone No.:* (212) 697-0110

Subject	Description
<b>FINANCE</b>	<p><b><i>The Financial Data Bank</i></b></p> <p>Warner's Financial Data Bank is a comprehensive, cost-effective data retrieval service. It provides the investment community with immediate access to security, financial and industry data, with facilities to generate reports in the form most suitable to each user's requirements. Where advanced financial analysis is called for, information from the data base may be read into programs written in Warner's powerful application languages. The Data Bank is comprised of three data basis — The Exchange Master, which contains stock market information; Compustat, which contains fundamental data on companies and the FDIC database which contains fundamental data on commercial banks.</p> <p>Daily price (high, low, close, or bid and asked) and volume data for over 10,000 issues for the past six years.</p> <p>Daily price information for major market indexes: Dow Jones, Standard &amp; Poor, New York Stock Exchange, American Stock Exchange and NASDAQ.</p> <p>The Compustat utilities data base with 90 annual and 98 quarterly data items for some 185 class A gas and electric utilities and subsidiaries.</p> <p>Descriptive information for over 14,000 federally insured commercial banks.</p> <p>More than 175 annual and quarterly balance sheet items from the Report of Condition, and approximately 100 annual and semiannual statement items from the Report of Income.</p> <p>Any of the items available from any data base may be accessed directly by programs written in Warner's Extended FORTRAN IV, APL and ANSI COBOL. They may also be interfaced to PROFORMA II, a system designed specifically for business planning and reporting. This greatly extends the usefulness of the data bases. Cost effective programs can be written to generate reports tailored to any application. The possibilities are limited only by the user's imagination. Areas of immediate application include portfolio management, securities analysis, financial analysis, screening, merger and acquisition analysis, credit analysis and corporate planning. Warner's Marketing and Technical Staff are available to help you develop systems in the above areas.</p>



*Company Name* : WARNER COMPUTER SYSTEMS, INC.  
*Headquarters Address* : 605 Third Avenue, New York, NY 10016  
*Headquarters contact* : Mark Owades *Telephone No.:* (212) 697-0110

**Subject**

**Description**

**STOCK AND BONDS**

***Stock Market***

Technical Stock Market information on the major exchanges, including number of advances/declines, upside/downside volume, number of new highs and lows, price/earnings ratios and bond and stock yields.

Weekly prices for over 100 Standard & Poor's industry indicators.

Latest 12-months' earnings per share and indicated dividend rates.

Bond information, including quality rating codes, maturity dates, amount outstanding and coupon rates.

Descriptive information, including ticker symbol, CUSIP number, SIC code, exchange codes and security types.

The COMPUSTAT industrial data base contains quarterly and annual information on some 3,500 public companies. Annual information covers 171 items (income statement, balance sheet and source and use) over the last 20 years. Quarterly information covers 65 similar items over the last 40 quarters.

**MANAGEMENT SCIENCES PROGRAMS**

<b>ADP Network Services, Inc.*</b>	
APECS .....	VI.020
<b>Avco Computer Services</b>	
PMS IV .....	VI.040
<b>Boeing Computer Services Company</b>	
EIS .....	VI.060
PROJECT/2® .....	VI.061
<b>CallData Systems, Inc.</b>	
PERT6 .....	VI.080
PROSYS/80 .....	VI.081
Data Resources, Incorporated	
TEMPO .....	VI.100
<b>General Electric Info. Serv. Co.</b>	
ASTRA .....	VI.120
EMPS .....	VI.121
GPSS V .....	VI.122
MPS III .....	VI.123
MPSX .....	VI.124
<b>Honeywell DATANETWORK</b>	
PMCS .....	VI.140
PRODUCTION SCHEDULING .....	VI.141
<b>Informatics Inc. - Data Services Division</b>	
PREMIS .....	VI.160
Mitrol, Inc.	
MIMS .....	VI.180
National CSS, Inc.	
BAS .....	VI.200
DYNAMO II .....	VI.201
MPSIII .....	VI.202
SPX/TIME .....	VI.203
TELOS .....	VI.204
<b>On-Line Systems, Inc.</b>	
OSCAR .....	VI.220
<b>Scientific Time Sharing Corporation</b>	
CMCS .....	VI.240
<b>Sun Information Services Company</b>	
PICOM .....	VI.270
PREMIS .....	VI.271
Tymshare, Inc.	
EXPRESS .....	VI.260
<b>University Computing Company</b>	
FMPS & GAMMA 3 .....	VI.280
N5500 .....	VI.281

\*Companies shown in **bold print** are Corporate Members of ACU.







Company Name : BOEING COMPUTER SERVICES COMPANY

Headquarters Address : Corporate Headquarters, 177 Madison Ave., Morristown, NJ 07960

Product Name : EIS (Executive Information Services)

Number of years commercially available : (Two) 2

Date of last up-date or improvement : October, 1978

Approximate number of current users : 200

Purchase price if available on in-house equipment : Variable based on modules desired

Type(s) of equipment compatible for in-house use : IBM 370 with CMS

Headquarters contact : Robert L. Cullen

Telephone No.: (206) 773-2790

## General Description

EIS is a financial analysis and forecasting system, with which the user interacts with the system conversationally or batch. Both the logic and the systems are English.

EIS is a full function system with all functions completely integrated. It has modeling report writing, high resolution graphics, a stat and forecasting library, a financial library, and a data base specifically designed for time spread data.

The data base allows users to define and structure commands and data hierarchies, automatically generate computational summaries, store numerous iterations of data throughout the decision-making processes, and automatically accounts for data over time. The retrieval of raw data and/or report formats with any combination of literal, numeric and graphical displays allows users access to the data based upon their request specifications.

The EIS report writer and graphics features can produce the high quality output required for top management. The two can be combined to produce reports with both tabular and graphics data. The user has complete systems control to enter commands at the terminal and immediately see the result of his request, or conveniently store them in files that can be executed with just one command.

## Special Features

- Ten graph types: (time series, functional, horizontal bar, vertical bar, horizontal stock market, vertical stock market, log log, semilog, log-log squared, and pie) with eight line types and seven shading types.
- Scope, flatbed, and daisy wheel graphics supported.
- Financial Applications Library: Investment Analysis, Lessee/Buy Analysis, ROI, Depreciation, Loan, Backward Iteration.
- Statistical Applications Library: Regression Analysis, Exponential Smoothing, Analysis of Variance, Hypothesis Testing, Common Sampling Distributions.
- Zero Base Budgeting supported as a data base application.
- What-if Analysis capability in models and data base.



Company Name : **BOEING COMPUTER SERVICES COMPANY**

Headquarters Address : **177 Madison Avenue, Morristown, NJ 07960**

Product Name : **PROJECT/2®\***

Number of years commercially available : **Five (5)**

Date of last up-date or improvement : **1977**

Approximate number of current users : **Several**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **James H. Milton**

Telephone No.: **(703) 821-6323**

### **General Description**

**PROJECT/2** is a total software package for network based project scheduling and control. Through simple English-language commands, the project planner can easily adjust the network whenever conditions change. He can produce an instant picture of any new situation. Over 30 tabular and graphic reports can be produced to provide the specific information needed by each level of management within an organization or project.

**PROJECT/2** is a comprehensive scheduling tool which offers Network Plotting, CPM Scheduling, Progress Control, Cost Processing, Resource Allocation and Constraining and Multiproject features. **PROJECT/2** can process Activity-on-Arrow and Activity-on-Node networks using sophisticated scheduling algorithms.

**\*PROJECT/2®** is a registered trademark of and licensed from Project Software and Development, Inc., Cambridge, Massachusetts.

### **Special Features**

Date: **May, 1979**

Submitted By: **James H. Milton, Product Manager**



Company Name : CALldata SYSTEMS, INC.

Headquarters Address : 20 Crossways Park N., Woodbury, NY 11797

Product Name : PERT6

Number of years commercially available : 4

Date of last up-date or improvement :

Approximate number of current users :

Purchase price if available on in-house  
equipment :

Type(s) of equipment compatible for  
in-house use :

Headquarters contact : Les Seskin, Product Manager

Telephone No.: (215) 545-5600

## General Description

The PERT6 system available on Calldata's CompUtility Time-Sharing Service is a management information system with a number of subroutines linked to it. One of these subroutines is a scheduling (PERT) routine which schedules tasks according to time and resource constraints. Another routine offers easy updating of the project file, allowing user defined, free format input.

The basis of the information system is a data base (project file) containing various records (tasks). Each record is made up of many fields. Each of these fields is available to the user for any desired use, except for field 1 which is the record identification (I.D. field) and must be different for each record in the file. The other fields may be used for such information as description, responsibility, incremental cost, fixed cost, planned/estimated/actual start and finish dates. This data may be entered, manipulated, and retrieved as required by the user. The insertion of data in any field except the first is optional.

## Special Features

The reports that can be produced are typically:

- Day by day resource utilization.
- Day by day, or month by month cash flow.
- Schedule of all events in a project.
- Schedule of milestones in a project.
- Weekly or monthly schedules for all or selected departments.

Date: May, 1979

Submitted By: Curt DeForest, Vice President



Company Name : CALldata SYSTEMS, INC.  
Headquarters Address : 20 Crossways Park N., Woodbury, NY 11797

Product Name : PROSYS/80  
Number of years commercially available : 2  
Date of last up-date or improvement :  
Approximate number of current users :  
Purchase price if available on in-house equipment : 1  
Type(s) of equipment compatible for in-house use : 2  
Headquarters contact : Les Seskin, Product Manager Telephone No.: (215) 545-5600

### General Description

The PROSYS/80\* project control system available via Calldata's Nationwide TS\*RJE Service integrates project scheduling, cost control, accounting, resource leveling, forecasting, performance measurement, and database management. Among its tabular and graphic outputs are schedules, comparison schedules, network logic diagrams, cash flow reports, and manpower leveling charts.

PROSYS/80 is a FORTRAN system which gives it hardware independence. PROSYS/80 executes in a batch environment, however, input as well as output may be performed in a time-sharing environment.

The system is modular: thus the user selects the features and options to suit his specific application. The basic scheduling module is mandatory, but the use of any one or any combination of the remaining seven modules is optional. The modules are:

- Basic Scheduling
- Time Scale
- Target File
- List Record
- Network Logic Display
- Sub Network Duplicator
- Resource/Cost Control
- Resource Leveling

\*PROSYS/80 is a Registered Trademark of Calldata Systems, Inc. and was developed by Elite Data Systems, Inc.

<sup>1</sup> System available for purchase, lease or network services; prices quoted on request.

<sup>2</sup> IBM 360/370, CDC CYBER, HONEYWELL 6600, UNIVAC, AMDAHL.

### Special Features

- Extensive selection, sorting and summarization capability for clear exception reporting.
- Resource analysis report helps the user to optimize his resources.
- Produces earned value reports which measure productivity by comparing resources expended vs. resources scheduled.
- Resource leveling capabilities based on user-selected resources and/or costs.
- Total cost control and resource control system. Includes actual and estimated values.
- Produces cash flow, deviation and expenditure reports at various levels of detail.

Company Name : DATA RESOURCES, INCORPORATED

Headquarters Address : 29 Hartwell Avenue, Lexington, MA 02173

Product Name : TEMPO Mathematical Programming System

Number of years commercially available : Five (5)

Date of last up-date or improvement : February, 1978

Approximate number of current users : 75

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Sanford R. Friedman

Telephone No.: (617) 861-0165

### General Description

The TEMPO Mathematical Programming System is a complete linear, separable nonlinear, and integer programming system developed by Burroughs Corporation and modified by Data Resources, Inc., for use on the DRI system. It offers the latest advances in computing techniques for linear programming and its extensions. Flexible data management facilities provide control over model generation, problem solution, and report writing, plus communication with modeling, graphics, and report-writing software in DRI's EPS LANGUAGE and APL interactive programming systems.

TEMPO offers the efficiency and capacity of a full-scale mathematical programming system for both interactive and economical batch mode operation. The free-format natural-language TEMPO Control Language allows the interactive user to create or revise a model, control the solution strategy, and review full or selected results on-line—or to specify a complete off-line solution procedure for models large enough to warrant unattended solution. A macro facility allows the user, or his DRI consultant, to set up sophisticated custom-tailored update, solution, and reporting procedures for use by non-technical personnel.

### Special Features

- Solves problems with up to 65,535 rows and any number of columns.
- Complete interactive matrix input and revision facilities.
- Accepts MPSX and SHARE input data formats.
- Automatic controls for candidate vector selection, partial pricing, and reinversion.
- Complete postoptimal analysis facilities, including Ranging, Parametrics, and Composite right-hand side and cost row.
- Extended branch and bound for integer and mixed-integer solutions.
- Can terminate and restart a run from advanced bases.
- Flexible interpolation procedures for nonlinear separable functions.



Company Name : GENERAL ELECTRIC INFORMATION SERVICES COMPANY

Headquarters Address : 401 N. Washington St., Rockville, MD 20850

Product Name : ASTRA

Number of years commercially available : Four (4)

Date of last up-date or improvement : May, 1976

Approximate number of current users : 40

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : D. Lowry

Telephone No.: (301) 340-4463

## General Description

ASTRA is a Background Service resource allocation program which enables simultaneous scheduling of up to 50 projects using a common pool of resources. It provides maximum resource utilization with minimum project duration and time costs.

ASTRA\*\*\* is a Foreground Service interface command-driver program for ASTRA which automatically submits jobs to Background and retrieves output for printing at terminal or on high-speed printer.

## Special Features



Company Name : GENERAL ELECTRIC INFORMATION SERVICES COMPANY

Headquarters Address : 401 N. Washington St., Rockville, MD 20850

Product Name : EMPS

Number of years commercially available : Three (3)

Date of last up-date or improvement : April, 1977

Approximate number of current users : 48

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : D. Lowry

Telephone No.: (301) 340-4463

### General Description

EMPS (Employee Management and Planning System) offers an information system designed to aid managers in scheduling work forces which can provide continuous service of high quality performance and lowered operating costs. The EMPS System encompasses five functional modules which allow (1) the forecasting of the number of people needed to handle anticipated workloads; (2) the scheduling of a work force; (3) the allocating of optimum schedules; (4) the administering of the work force through maintenance of accurate records and reports; and (5) the days off and shift assignment to employees. The system is particularly effective for the telephone and airline industries.

### Special Features

Date: May, 1979

Submitted By: D. Lowry





Company Name : GENERAL ELECTRIC INFORMATION SERVICES COMPANY

Headquarters Address : 401 N. Washington St., Rockville, MD 20850

Product Name : GPSS V

Number of years commercially available : n.a.

Date of last up-date or improvement : n.a.

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : D. Lowry

Telephone No.: (301) 340-4463

### General Description

The VS Background General Purpose System Simulator, IBM GPSS V, is claimed to be the most advanced and widely used of all simulation systems. GPSS V can handle models ranging from simple ones to very complex, large-capacity ones. Models of equivalent complexity and size are reported to run for 1/20th of the cost of Foreground GPSS\*\*\*.

### Special Features

With GPSS V, no programming is required, changes can be made easily, there is simple job control language, input is free form, and the product is upward compatible with GPSS III and GPSS/360.



Company Name : GENERAL ELECTRIC INFORMATION SERVICES COMPANY

Headquarters Address : 401 N. Washington St., Rockville, MD 20850

Product Name : MPS III

Number of years commercially available : (New to GEISCO)

Date of last up-date or improvement : n.a.

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : D. Lowry

Telephone No.: (301) 340-4463

## General Description

An advanced optimization system based on linear programming, MPS III has the capability to handle up to 50,000 constraints (LP rows) and 300,000 variables. It contains special modules for quadratic and mixed integer optimization as well as data management routines for ease of input and report preparation.

MPS III operates on VS Background Service.

## Special Features

Date: May, 1979

Submitted By: D. Lowry



Company Name : GENERAL ELECTRIC INFORMATION SERVICES COMPANY

Headquarters Address : 401 N. Washington St., Rockville, MD 20850

Product Name : MPSX

Number of years commercially available : n.a.

Date of last up-date or improvement : n.a.

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : D. Lowry

Telephone No.: (301) 340-4463

## General Description

MPSX, IBM's Mathematical Programming System is available on VS Background Service, provides a control program and compiler; a set of nearly 50 procedures for linear, separable, and mixed integer programming; and various matrix generation and writing aids. Problem size can go to 16,000 rows.

MPSX is compatible with most MPS/360 and MPS/370 systems.

## Special Features



Company Name : Honeywell DATANETWORK

Headquarters Address : Honeywell Plaza, Minneapolis, MN 55408

Product Name : Project Management & Control System (PMCS)

Number of years commercially available : One (1) +

Date of last up-date or improvement : n.a.

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : Available upon request

Type(s) of equipment compatible for in-house use : Honeywell Series 6000, Series 66

Headquarters contact : DATANETWORK Marketing Support Telephone No.: (612) 870-6000

### General Description

Honeywell's Project Management and Control System (PMCS) is a tool for effective planning, scheduling, and project control. PMCS provides both precedence charting and PERT/CPM networking capabilities for any kind of problem. PMCS is a large capacity (20,000 items, 50,000 relationships, 480 milestones, 52 networks and 99 calendars) system for Major Construction projects and buildings, AEROSPACE projects or Large Scale Assembly type (shipbuilding, aircraft assembly) applications. PMCS has four programs for network generation, update and progress report, data maintenance and reporting. Eight levels of sorting is allowed. There are 12 reports available: Summary BAR Chart, Milestone, Work Status and Progress, Schedule, Work Item Duration and Time Frame BAR Chart, Resource Assignment, Resource Utilization, Lump Sum Cost, Monthly Cost, Precedence Report, Calendar and Master File. Input is in 80 column card format. The system can be run from any remote station or low speed terminal.

### Special Features

- Flexible reporting options
- Input data verification
- Diagnostic messages
- Audit Trail option
- Three calculation dates
- Multiple starts/finishes
- Network logic (LOOPS) diagnostics
- Internal checkpoints for recovery
- Lagged or delayed relationships
- Work item descriptions: a) # days per week option, b) Shift 1, 2, or 3, c) Flexible start day, d) Start/Finish day options, e) Calculated early/late days, f) Percentage or days of progress option, and g) Three kinds of cost.



Company Name : **Honeywell DATANETWORK**

Headquarters Address : **Honeywell Plaza, Minneapolis, MN 55408**

Product Name : **Production Scheduling and Control/66**

Number of years commercially available : **Three (3) +**

Date of last up-date or improvement : **n.a.**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **Available upon request**

Type(s) of equipment compatible for in-house use : **Honeywell Series 60, Level 66 & Series 6000**

Headquarters contact : **DATANETWORK Marketing Support** Telephone No.: **(612) 870-6000**

### **General Description**

Honeywell's Production Scheduling and Control/66 is a system for scheduling the flow of materials through a shop. PSC/66 helps control production facilities, schedule and monitor factory work tasks and plan realistic capacity requirements.

PSC/66 maintains complete descriptions of work centers and routings, updating these from new manufacturing planning and capacity data.

PSC/66 schedules and loads planned and released orders into work centers, determines the required capacity of the shop, schedules factory resources up to 24 months. Overloads and underloads are highlighted as work is sequenced, based upon user-controlled and system monitored priorities.

PSC/66 monitors all phases of that activity against planned performance standards.

The PSC/66 Data Base is structured by Honeywell's Integrated Data Store (IDS), which simplifies maintenance and reduces redundancy.

PSC/66 can be combined with Honeywell's Inventory Management System/66, which is a preprogrammed materials requirement planning application for planning and controlling material at all levels of product structure - stocked or unstocked, finished items or raw materials.

### **Special Features**

- Forward and backward scheduling
- Automatic rescheduling of changed orders
- Scheduling on an expedite or exception basis
- Shop order cost calculation and monitoring
- Projection of completion costs and dates
- Long-range capacity requirements planning
- Operation splitting and overlapping
- Scheduling of critical materials or tooling by specific operation
- Simplified user feedback options



Company Name : **INFORMATICS INC. - DATA SERVICES DIVISION**

Headquarters Address : **6 Kingsbridge Road, Fairfield, NJ 07006**

Product Name : **PREMIS**

Number of years commercially available : **3**

Date of last up-date or improvement : **February 28, 1979**

Approximate number of current users : **20 companies**

Purchase price if available on in-house equipment : **\$40,000 and up\***

Type(s) of equipment compatible for in-house use : **IBM 370/145 and up**

Headquarters contact : **Parlichehr Hanly**

Telephone No.: **(201) 575-2845**

### General Description

**PREMIS is a full-capabilities project planning and scheduling system. It uses the Precedence technique or the I/J technique to define a network.**

**PREMIS does time-analysis, resource-levelling, and reporting. It handles small to very large projects and has comprehensive facilities for maintenance scheduling. In its standard form, it offers: 10-character activity codes, 240-character activity descriptions, (precedence) up to 64,000 activities and up to 200 predecessors per activity, (in I/J) a virtually unlimited number of activities, and up to 200 resources per activity.**

**Up to 8 different calendars can be defined for a project. PREMIS (precedence) supports start-to-start, finish-to-start, finish-to-finish, and parallel relationships, with zero, positive, or negative lags, in both time-analysis and resource-levelling. PREMIS (I/J) offers "transits before" and "transits after" for overlapping activities. Dates can be imposed on activities: for example, finish not later than. Multiple begins and ends, subnetting, library modules, etc., are supported. For updating, PREMIS offers explicit and automatic progressing, based on a time-now.**

**For resource-levelling, strategies and priorities are user-defined. Complex and varying resources can be specified; resources can have alternate resources; and can be defined as splittable and as tied. PREMIS features the serial method of resource allocation, but the parallel method can be used with I/J networks.**

**\*From K&H Computer Systems, Inc., Sparta, NJ.**

### Special Features

- **PREMIS can be accessed from a time-sharing environment that provides facilities for data preparation, editing, and verification plus automatic generation of related JCL. PREMIS may also be used on Informatics conversational remote-job-entry system.**
- **Although a set of standard input forms are available, plus a series of standard tabular reports, bar charts, and histograms, PREMIS input, updating, and report-generation is controlled by "Instream" code, allowing user-customizing of input and output.**
- **Unique features: 8 calendars per project, overlapping of activities in I/J networks, variable resource patterns, serial resource-levelling technique.**

Company Name : MITROL, INC.

Headquarters Address : 1050 Waltham Street, Lexington, MA 02173

Product Name : MIMS (MITROL INDUSTRIAL MANAGEMENT SYSTEMS)

Number of years commercially available : 6

Date of last up-date or improvement : March, 1979

Approximate number of current users : 55

Purchase price if available on in-house equipment : 1\*

Type(s) of equipment compatible for in-house use : 2\*

Headquarters contact : Richmond Woodward

Telephone No.: (617) 862-6350

## General Description

The MIMS system is an integrated management information and control system for industry. It is now used in the following application areas, and can easily be extended to others:

- Engineering (Bills of Materials)
- Inventory Control
- Production Control and Shop Floor Tracking
- Purchasing and Receiving
- Sales Order Tracking
- Material Requirements Planning (MRP)
- Capacity Planning
- Financial Planning and Cost Control
- Configuration Management (both engineering drawings and serial number lot tracking)

The MIMS system includes:

- A generalized network-model database management system designed following CODASYL standards, to enable a centralized file system.
- An English-like query language allowing user definition of updating transactions and of reports, and/or the database itself.
- Specialized requests for industrial management applications (cost roll-ups, what-if cost stimulations, stock-room kitting, etc.)
- An MRP consistent with the most recent concepts and development in industrial management.

MIMS is available as a timesharing service with batch capabilities, or it can be purchased for in-house use. Implementation of a full manufacturing control system with MIMS takes less than a month, and the resulting system can easily be modified to meet new requirements.

## Special Features

- Facilities to produce comprehensive audit reports of all or of user-selected transactions.
- Computed fields, which are automatically updated as other field values change.
- Files, fields and relations can be defined to satisfy the special requirements of a wide variety of manufacturing applications.
- Material Requirements Plan can produce any number of user defined reports, each with different formats and presentation of data, including Peg reports for requirements and work-center loading.
- English-like Request Language is easily learned by people without programming background.

<sup>1</sup>\*\$175,000 plus maintenance; lease plan also available.

<sup>2</sup>\*IBM 370/138 or larger, with 512K real memory; operating system requirements VM/CMS or OS/VS.



Company Name : **NATIONAL CSS, INC.**

Headquarters Address : **187 Danbury Road, Wilton, CT 06897**

Product Name : **Business Accounting Systems (BAS)**

Number of years commercially available : **Three (3)**

Date of last up-date or improvement : **March, 1977**

Approximate number of current users : **55**

Purchase price if available on in-house equipment : **Available on NCSS network only**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Manager of Business Accounting Systems** Telephone No.: **(203) 762-2511**

## General Description

**Business Accounting Systems (BAS)** is a library of programs, which, when selectively grouped together, provides the most efficient approach to your accounting requirements. The modular concept of BAS is designed to fit your business environment without imposing the restrictions of a prepackaged system. Although fully developed, the operation of the system is tailored to your needs: existing forms can be used for data entry; current procedures can be accommodated; special report formats can be specified.

The basic BAS library consists of three modules: **GENERAL LEDGER**, **ACCOUNTS PAYABLE**, and **ACCOUNTS RECEIVABLE**. These modules, developed in accordance with generally accepted accounting principles, provide complete audit trails, user-controlled accounting periods, and interactive data manipulation. These modules are capable of standing alone or operating in an integrated environment.

**GENERAL LEDGER** - The automated financial reporting capability offered by the General Ledger module facilitates your month-end closing. Consolidated Income Statement, Budgetary and comparative financial reporting, provide increased control.

**THE ACCOUNTS PAYABLE SYSTEM** is a voucher payables system that is capable of check production and full reporting of vouchered and paid invoices. Accounts Receivable is an open item Accounts Receivable System that contains an on-line credit inquiry feature, allowing you to check the current status of any customer's account.

**THE ACCOUNTS RECEIVABLE MODULE** is a flexible, general purpose library of programs which provides the user with automated procedures for managing his accounts receivables. Operation of the system is oriented to the user's own specific accounting requirements, procedures, and personnel and does not require any prior knowledge of computers or programming.

## Special Features

**BAS** provides the basis for satisfying changes in your company's operating and reporting requirements. The BAS software operating on the National CSS network will not only satisfy your basic accounting needs but will actually help you improve your operations.



Company Name : NATIONAL CSS, INC.  
Headquarters Address : 187 Danbury Road, Wilton, CT 06897

Product Name : DYNAMO II (Product of Pugh-Roberts Associate, Inc.)  
Number of years commercially available : Fifteen (15)  
Date of last up-date or improvement : June, 1977  
Approximate number of current users : 700  
Purchase price if available on in-house equipment : Batch \$500 per year; Interactive \$1,200 per year  
Type(s) of equipment compatible for in-house use : IBM System/370; ISO, OS/VS CMS  
Headquarters contact : M. Z. Malkana Telephone No.: (203) 762-2511

## General Description

DYNAMO is a compiler for translating and running continuous simulation models (models described by a set of differential equations). It was developed by the industrial dynamics group at MIT for simulating dynamic feedback models of business, economics and social systems, but there is nothing in its design that precludes its use for any continuous system.

DYNAMO has been designed for the person who is problem oriented rather than computer oriented. It makes available easy to use computing facilities so that the user can focus his attention on building a useful model without worrying about the complex computer requirements.

The mechanics of using DYNAMO are very simple. Output can be specified easily, yet both tabular and plotted output are available. Comparative plots simplify the measurement of the impact of policy and parameter changes on model results. Comparative tabular output is also available.

The ease of use includes trivial requirements on the order of equations and direction cards. Model initialization is simplified by DYNAMO's automatic initialization of many variables.

The most recent DYNAMO, DYNAMO III, offers arrays to simplify the duplication of disaggregated sectors. Both DYNAMO III and the earlier DYNAMO II offer user-defined macros as a means for the user to define his own functions within DYNAMO equation systems.

## Special Features

Both DYNAMOs thoroughly check a model for serious errors and report them in easily understood terms. The user is never faced with just a core memory dump to debug an error.

The user can order model equations to suit his/her own purpose. DYNAMO re-orders them for computational purposes.

DYNAMO's "load & go" feature simplifies running a model. Arrays are available in DYNAMO III to simplify the construction of large models with repeated sectors.



Company Name : NATIONAL CSS, INC.  
Headquarters Address : 187 Danbury Road, Wilton, CT 06897

Product Name : MPSIII\*  
Number of years commercially available : Eight (8)  
Date of last up-date or improvement : September, 1978  
Approximate number of current users : 75  
Purchase price if available on in-house equipment : \$250 per month for basic systems, up to \$2,600/month for the total system  
Type(s) of equipment compatible for in-house use : IBM: System 360/40 and above, System 370/145 and above, AMDAHL - 470  
Headquarters contact : M. Z. Malkana  
Telephone No.: (203) 762-2511

### General Description

MPSIII is the most advanced mathematical programming system especially for applications involving large/complex linear programming models and associated databases. Such systems are used widely for operations planning, financial planning, engineering design, short-term scheduling and resource allocation in industries such as petroleum refining, forest products, paper, consumer products, food & beverages, chemicals, manufacturing, transportation and many others.

MPSIII is a modular system, consisting of seven major components.

BASIC SYSTEM: Control System and standard optimizer  
GUB: Generalized Upper Bounding Optimizer  
WHIZARD: In-Core Optimizer  
MISTIC: Mixed-Integer Optimizer  
LOCKBOX: Location and Distribution Facilities Optimizer  
DATAFORM: Data Management System  
QUAD: Quadratic Programming Optimizer

MPSIII/OL is an adaptation of the full MPSIII system for use in an interactive (On-Line) computing environment.

\*MPSIII is a product of Ketron, Inc., Arlington, Virginia.

### Special Features

All components of MPSIII are available in both the standard (batch) or interactive versions. The Basic System is the prerequisite for the optional components, which can be used in any combination to meet individual requirements. All components operate under the procedure control language (PCL), a component of the Basic System.

HIGH SPEED SOLUTION CAPABILITY - permits thorough analysis of the classic "what-if.." question that makes LP so valuable as a planning tool.

COMPLETE DATA MANAGEMENT FACILITY - DATAFORM is the first true data management system designed for model building.



Company Name : NATIONAL CSS, INC.

Headquarters Address : 187 Danbury Road, Wilton, CT 06897

Product Name : SPX/TIME (Product of Gwilym, Jenkins & Partners, England)

Number of years commercially available : Ten (10)

Date of last up-date or improvement : February, 1976

Approximate number of current users : 25

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : IBM System 370, AMDAHL - 470

Headquarters contact : M. Z. Malkana

Telephone No.: (203) 762-2511

## General Description

SPX/TIME is a set of computer programs that allow you to perform time series analysis and forecasts in an interactive time-sharing environment.

SPX/TIME uses Box-Jenkins Techniques for stochastic (univariate) as well as transfer function (multivariate) model building. It also has seasonal adjustment facilities using X-11 program of the U.S. Census Bureau.

SPX/TIME performs all the calculations necessary in determining the types of behavior exhibited by the time series. On the basis of this determination, the series is identified with a model which best fits the specific nature of the series. This process is the key to the high accuracy of Box-Jenkins forecasts. Using the model fitted to the time series, SPX/TIME calculates short-term forecasts from any time origin.

## Special Features

- Easy to use
- Easy to understand user documentation
- Transfer function forecasting capability
- X-11 seasonal adjustment facilities
- Complete technical support and training



Company Name : NATIONAL CSS, INC.

Headquarters Address : 187 Danbury Road, Wilton, CT 06897

Product Name : TELOR (Product of Norbert Bryard, France Company)

Number of years commercially available : Ten (10)

Date of last up-date or improvement : November, 1977

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : IBM 360/40 and above, IBM 370/145 and above, AMDAHL - 470

Headquarters contact : M. Z. Malkana

Telephone No.: (203) 762-2511

### General Description

TELOR is a project planning and management system that can be applied to any project requiring scheduling, resource analysis and evaluation. TELOR provides a practical means of applying techniques of network analysis and resource leveling to both large and small projects.

TELOR has, to a considerable extent, simplified network construction and analysis. No diagramming is necessary in the construction of TELOR networks. The manager logically determines a network by adhering to a few simple guidelines, and is able to either slightly modify or radically overhaul the network.

Using the TELOR method, you develop a practical plan, determine the resource needs, time-frame, etc. This information is formatted appropriately for TELOR, submitted, and TELOR computes the network and schedules the dates. TELOR can then be used to generate reports for cash-flow, internal rate of return, resources, or graphs. By this method, you can either slightly modify or radically overhaul the project plan; you can develop the most efficient plan according to your conditions.

### Special Features

- TELOR has been optimized for the broadest possible range of network planning solutions. And up to 100,000 separate activities can be defined for a project.
- TELOR optimized the utilization of resources.
- Computes discounted Cash Flow and Internal Rate of Return.
- Calculates the financial impact of changes to the basic plan.
- TELOR is designed for maximum operation efficiency and thereby lower operating costs.

Date: May, 1979

Submitted By: M. Z. Malkana, Project Manager



Company Name : **ON-LINE SYSTEMS, INC.**

Headquarters Address : **115 Evergreen Heights Drive, Pittsburgh, PA 15229**

Product Name : **OSCAR**

Number of years commercially available : **Five (5)**

Date of last up-date or improvement : **September, 1978**

Approximate number of current users : **Over 50**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **E. Richard Artus** Telephone No.: **(412) 931-7600**

### General Description

OSCAR, On-Line's System for Controlling Activities and Resources, is designed to assist management in effective project planning, scheduling, monitoring, and control. It offers resource-constrained scheduling in addition to conventional critical path method scheduling. Resources (people, machines, etc.) can be identified by category or by individual. Resources in a common resource pool may be allocated to one or more projects.

With minimal effort an excellent set of reports can be obtained for planning and evaluation purposes. Computer generated network diagrams and project bar charts may be produced on the plotter at On-Line Systems. In addition to the standard reports, the user may create virtually any kind of report through the OSCAR interface with OLIVER, On-Line's data base management system.

Periodic schedule updates and revisions can be done easily to reflect actual conditions. Valuable monitoring/control information can be obtained through impact reports which show actual progress by comparing the most recent revised schedule with the planned baseline schedule.

In summary, OSCAR simplifies project management. It is easy to learn, cost effective, and can be used to advantage in scheduling and tracking almost any sizable project which requires consideration of how the available time, money, people, and machines can best be used.

### Special Features

OSCAR is a powerful yet easy to use system, requiring no special programming knowledge. Among its features are:

- English language commands
- Precedence diagramming method
- Resource allocation
- Built-in editor
- Multiproject scheduling with priorities
- Holidays (plant shutdowns)
- Positive and negative lead/lag
- Part-time activities
- Part-time workers
- Overtime
- Vacations (machine shutdowns)
- Status updating
- Impact scheduling
- Activity constraints
- Standard reports for terminal and plotter
- Customized reports through interface with data base management system, OLIVER
- Automatic network diagrams
- Variable work week definition





Company Name : **SCIENTIFIC TIME SHARING CORPORATION**

Headquarters Address : **7316 Wisconsin Avenue, Bethesda, MD 20014**

Product Name : **CMCS (Comprehensive Manufacturing Control System)**

Number of years commercially available : **3**

Date of last up-date or improvement : **June, 1978**

Approximate number of current users : **20 Corporations**

Purchase price if available on in-house equipment : **\$50,000+**

Type(s) of equipment compatible for in-house use : **S/370 Compatible**

Headquarters contact : **James S. Russell**

Telephone No.: **(408) 287-9820**

### **General Description**

The APL\*PLUS Comprehensive Manufacturing Control System is an integrated planning and control system serving the areas of materials management, manufacturing, production resources and inventory investment.

CMCS enables the user to control all aspects of the manufacturing process:

- Forecasting
- Inventory Management
- Production Scheduling
- Materials Requirements Planning
- Shop Floor Control
- Warehousing and Distribution

Specific provisions are included within these applications for: product structure, level by level explosion of net requirements, process routines, status of open orders by manufacturing step, daily shop floor control, master scheduling with capacity planning, scientific inventory management decision rules for safety stocks and economical production quantities, statistical forecasting of direct demand, marketing intelligence and multi-warehouse distribution.

### **Special Features**

- Marketing Intelligence
- Computerized Calendar
- "Trial-Fit" Production Schedules and "What-If" Capabilities
- Daily Worksheets
- Management Reports
- Purchasing Control





Company Name : TYMSHARE, INC.  
Headquarters Address : 20705 Valley Green Dr., Cupertino, CA 95014

Product Name : EXPRESS  
Number of years commercially available : Five (5)  
Date of last up-date or improvement : Continuous  
Approximate number of current users : n.a.  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Tom Abbott Telephone No.: (408) 446-6000

### General Description

EXPRESS, available on Tymshare's TYMCOM-370 service, is a decision support system developed by Management Decision Systems, Inc., Waltham, Mass., for on-line analysis, display, and modeling of data. EXPRESS allows the decision maker to gather, analyze, and update information about the operating environment, not with a series of related programs or packages, but within a single, integrated, user-oriented system. EXPRESS is used for a wide variety of inter-related applications, such as management science problems, market research analysis, financial modelling, financial analysis and control and sales analysis.

#### EXPRESS is:

**EASY TO USE** - A user can begin work immediately in EXPRESS with a highly interactive subset of the commands.  
**FLEXIBLE** - New data can be defined, existing data re-defined or transformed, commands defined or changed, and user supplied FORTRAN, or BAL routines included in the system.

**ABLE TO HANDLE LARGE PROBLEMS** — EXPRESS can accommodate databases significantly larger than allowed by other interactive systems.

**VERSATILE** - An extensive repertoire of information analysis tools is made available to the decision maker.

### Special Features

#### Analytical tools include:

- Regression analysis
- Correlation analysis
- Trend fitting
- S-curve fitting
- Moving averages
- Exponential smoothing
- Box-Jenkins
- ACCUFOR
- Bureau of Census X11
- Linear Programming
- Non-Linear estimation
- Automatic interaction Detection

#### • Factor analysis

#### Data Management:

- Database Definition
  - Data input and update
  - Database expansion
- #### Data Display:
- Ad-hoc data display
  - Formal report generator
  - Extensive graphics capability
- #### Modeling:

- Access to economic & financial data
- Solution of systems of simultaneous equations
- Financial modelling capabilities

Date: May, 1979

Submitted By: Tom Abbott, Manager - Applications Marketing

Carleton X-6241

Company Name : **SUN INFORMATION SERVICES COMPANY**

Headquarters Address : **680 E. Swedesford Road, Suite 310, Wayne, PA 19087**

Product Name : **PICOM**

Number of years commercially available : **6 months**

Date of last up-date or improvement : **September, 1979**

Approximate number of current users : **3**

Purchase price if available on in-house equipment : **\$40,000 purchase or perpetual lease or \$1,200 per month**

Type(s) of equipment compatible for in-house use : **IBM 370/168 or 3033**

Headquarters contact : **R. F. Sulzbach** Telephone No.: **(215) 293-0660**

## General Description

**PICOM (Project Information & Cost Management System)** is a specialized data handling system that controls and monitors costs in a project management environment. **PICOM** is based upon the project language used by its companion scheduling package, **PREMIS — Project Resource Evaluation and Management Information System** developed by **K & H Computer Systems, Inc.** in England.

**PICOM** represents a state-of-the-art data processing system designed to maintain and report project cost information in a flexible, cost-effective manner. Its foundation in the proven **PREMIS** generator languages make it reliable and easily integrated with the scheduling capability of **PREMIS**. The result is a functional cost/schedule integration system.

It offers cost accumulation and summarization through multiple pyramid structures, responsible individual tables, cost conversions through a rating capability time phased (historical and projected) cost data and report generator.

**PICOM** is available from **Sun Information Services** on the **IBM** networks in a batch mode. For more information contact your nearest **SIS** representative.

## Special Features

- Processes on **IBM** equipment under **OS, VS, MVS**
- Written in **Assembler** and **PREMIS** generator languages
- Based on operational software with four years of experience
- Efficient data storage techniques producing a single data record for all data related to a cost account
- Fully documented through application, technical and sample problem manuals
- Available training courses, consultation and technical support



Company Name : SUN INFORMATION SERVICES COMPANY  
Headquarters Address : 680 E. Swedesford Road, Suite 310, Wayne, PA 19087

Product Name : PREMIS  
Number of years commercially available : 5  
Date of last up-date or improvement : May, 1979  
Approximate number of current users : 10  
Purchase price if available on in-house equipment : \$50,000 purchase or perpetual lease or \$1,650 per month  
Type(s) of equipment compatible for in-house use : IBM 370/168 or 3033  
Headquarters contact : R. F. Suizbach Telephone No.: (215) 293-0660

### General Description

PREMIS (Project Resource Evaluation & Management Information System) utilizes proven network analysis techniques to establish a disciplined method of project planning and scheduling. Using these techniques, Project Managers are more capable of controlling the schedule and cost of today's projects.

PREMIS is a comprehensive and easy to use software package developed by K & H Computer Systems in England. Since its introduction into the United States in 1976, PREMIS has set the standard for capabilities of project scheduling software. Over 150 companies have used PREMIS around the world to control projects into billions of dollars. Industrial applications include construction, engineering, petroleum, ship building, transit systems, data processing, utilities, and steel.

PREMIS can manage the data required for your project application, since it is a workable system designed to be ...

- efficient and economical,
- easy to use, and
- flexible in reporting.

PREMIS is available from Sun Information Services Company on the IBM system in batch mode. For more information, please contact your nearest SIS representative.

### Special Features

- Input
- Resource Scheduling
- Multi-Calendar
- General
- Target Reporting
- Updating
- Reporting

PREMIS represents the state-of-the-art networking system designed to maintain and report activity information in a flexible and cost effective manner. It utilizes the same generator languages as SIS' Project Information and Cost Management (PICOM) System which makes it easily integratable with the cost capabilities of PICOM. This allows the system to meet all information handling and reporting requirements implied by the Cost/Schedule Control System Criteria.



Company Name : UNIVERSITY COMPUTING COMPANY

Headquarters Address : 1930 Hi Line Drive, Dallas, TX 75207

Product Name : FMPS and GAMMA 3

Number of years commercially available : 10

Date of last up-date or improvement : March, 1978

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : UNIVAC 1100

Headquarters contact : Ken Weaver

Telephone No.: (214) 655-8795

### General Description

FMPS (Functional Mathematical Programming System) offers you "State-of-the Art" mathematical programming techniques and algorithms that allow you to sample a variety of economic alternatives to any business situation you might be engaged in.

The design of this advanced system recognizes that industry and business require a variety of optimization techniques for efficient solutions of scheduling, planning, blending and transportation type problems.

FMPS is a series of building blocks from which a complete mathematical programming system, including independent input and output procedures, can be fashioned or it may be used as the optimization section of an existing model or simulation system. Special purpose algorithms may also be developed and added to FMPS because of its open-ended design.

GAMMA 3 is a program that can be used as an adjunct to FMPS and provides modules for data file management, matrix generation and report writing. GAMMA 3.4 is an extended version of GAMMA 3 that has capabilities for expanded accessing of FMPS communications file data, and working with Nested Do-Loops and Line and Page folding.

### Special Features

FMPS contains the following optimization procedures or system operating modes:

- Linear Programming Algorithm
- Generalized Upper Bounded Algorithm
- Mixed Integer Algorithm
- Separable Algorithms
- Non-Linear Algorithms

GAMMA 3:

- Multiple Input Options
- Data Driven Report Writer
- Full Computational & Logic Capabilities
- Comprehensive Formatting & Line Control

Date: May, 1979

Submitted By: Charles R. Shelton, Marketing Manager



Company Name : UNIVERSITY COMPUTING COMPANY

Headquarters Address : 1930 Hi Line Drive, Dallas, TX 75207

Product Name : N5500

Number of years commercially available : 1

Date of last up-date or improvement : January, 1979

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : UNIVAC 1100

Headquarters contact : Ken Weaver

Telephone No.: (214) 655-8795

### General Description

N5500 (Project Planning and Control System). This system developed by Nichols & Company and offered exclusively by UCC on its international computer network, enables project leaders and managers to successfully plan and control their projects. N5500 dramatically improves planning efficiency, highlights future loads and quickly indicates potential problem areas. N5500 is unsurpassed in ease of use, versatility and capability.

N5500's unique Dictionary tailors the system to your prescribed environment. Once you define and describe this environment, the transaction loading Dictionary establishes the framework for planning all your projects into the necessary elements known as TASKS. N5500 is flexible enough to adjust to any organizational methodology.

Reports are basically broken into turnaround work documents, detailed and summary project reports and easy-toread sponsor reports.

The system is written totally in ANS COBOL, makes efficient use of mainframe resources, can be used on-line or in batch mode and is easily applied to all project oriented activities.

N5500 networks can be graphically plotted using the EZPERT graphics software package.

### Special Features

N5500 has the following special features:

- Automatic Network Management
- Critical Path Management
- Event and Process Networking
- Variable Resource Load Smoothing
- Total Resource Accounting
- Automatic Project Generation
- Reporting for Matrix Organization
- Unlimited "What-if" Simulation
- Substantial Audit Capability
- Daily Automatic Load Leveling
- Extensive Data Validation
- Weekly Turnaround Progress Statements
- Project Graphics
- Easy, Uncomplicated Usage



INTERACTIVE ACCOUNTING SYSTEMS

<b>Amcort Computer Corporation</b>	
ACCOUNTS PAYABLE .....	VII.020
ACCOUNTS RECEIVABLE .....	VII.021
BUSINESS CONTROL SYSTEM .....	VII.022
GENERAL LEDGER .....	VII.023
PAYROLL .....	VII.024
<b>Avco Computer Services*</b>	
SIMPLAN .....	VII.040
<b>CallData Systems, Inc.</b>	
CALLPLAN™ .....	VII.060
<b>Computer Sharing Services, Inc.</b>	
FAS .....	VII.080
FRS .....	VII.081
<b>Construction Computer Control Corporation</b>	
SYSTEM FIVE .....	VII.100
<b>Datalogics, Inc.</b>	
DL/FAS .....	VII.120
IMPACS .....	VII.121
<b>General Electric Information Services Company</b>	
GEPAY\$ .....	VII.140
GFAST\$ .....	VII.141
<b>Metrocom, Inc.</b>	
POSITION .....	VII.160
<b>National CSS, Inc.</b>	
BAS .....	VII.180
BAS - ACCOUNTS PAYABLE .....	VII.181
BAS - ACCOUNTS RECEIVABLE .....	VII.182
BAS - GENERAL LEDGER .....	VII.183
<b>On-Line Systems, Inc.</b>	
ORBIS .....	VII.200
<b>Pryor Corporation</b>	
ON LINE MANUFACTURING SYSTEM .....	VII.220
RC/BASIC .....	VII.221
<b>Standard &amp; Poor's Fixed Income System</b>	
FIMS .....	VII.240

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Company Name : **AMCOR COMPUTER CORPORATION**

Headquarters Address : **1900 Plantside Drive, Louisville, KY 40299**

Product Name : **Accounts Payable**

Number of years commercially available : **Five (5) - 6**

Date of last up-date or improvement : **November, 1978 - Dec-1979**

Approximate number of current users : **100 - 150+**

Purchase price if available on in-house equipment : **\$3,800 - 15250**

Type(s) of equipment compatible for in-house use : **Digital Equipment Corporation PDP 11 series under RSTS/E**

Headquarters contact : **Robert G. Bearden** Telephone No.: **(502) 491-9820**

### General Description

AMCOR's on-line, interactive Accounts Payable Systems allows companies to maximize the value of all expended dollars via good vendor and payment control. Written in Basic-Plus for DEC's PDP-11 family of RSTS/E based computers.

- User Oriented (ease of operation - conversational mode)
- Good Accuracy/Audit control
- Multi-levels of detailed documentation at both the user and technical levels
- Installation support and training available
- State of the Art product as a direct result of AMCOR's continuing enhancement program for all products
- On-line, interactive terminal processing
- Complete audit trails
- Complete Maintenance facilities
- Demonstration System available upon request
- On-line editing and validation

### Special Features

- Does not allow duplicate payment of invoices
- Payment selection available at both vendor and invoice levels
- Transaction registers available upon demand
- Automatic check writing module with check register
- Aging Report available by operator defined or standard aging periods
- Checks reconciliation feature
- Voucher printing - automatically controlled
- Vendor Range reporting
- Vendor Activity Analysis
- General Ledger Spread and reporting module
- Allows for manually written checks
- Invoices may be expensed over multiple months
- Cash requirement reporting

Date: **July, 1979**

Submitted By: **Jim Sexton, V.P. of Computer Operation**



Company Name : AMCOR COMPUTER CORPORATION

Headquarters Address : 1900 Plantside Drive, Louisville, KY 40299

Product Name : Accounts Receivable

Number of years commercially available : Five (5) 6

Date of last up-date or improvement : December, 1978 ~~Dec.~~ Jan. 1980

Approximate number of current users : 100- 150+

Purchase price if available on in-house equipment : \$3,800 5250

Type(s) of equipment compatible for in-house use : Digital Equipment Corporation PDP 11 series under RSTS/E

Headquarters contact : Robert G. Bearden

Telephone No.: (502) 491-9820

### General Description

AMCOR's on-line Accounts Receivable system is designed to help improve cash flow, and bad debt control plus provide detail and summary reporting, upon demand to help management in the overall control of receivables and reduction in the average number of days it takes to collect receivables. Written in Basic-Plus for DEC's PDP-11 family of RSTS/E based computers.

- User Oriented (ease of operation - conversational mode)
- Good Accuracy/Audit control
- Multi-levels of detailed documentation at both the user and technical levels
- Installation support and training available
- State of the Art product as a direct result of AMCOR's continuing enhancement program for all products
- On-line, Interactive terminal processing
- Complete audit trails
- Complete Maintenance facilities
- Demonstration System available upon request
- On-line editing and validation

### Special Features

- Open Item detail available for all outstanding Invoices
- Operator selectable aging periods
- Credit limit control maintained
- Comprehensive Reporting module
- M-T-D and Y-T-D Sales Analysis available by customer and company
- Multi-Division processing ability
- Range selection in all reporting features
- User defined billing codes can be used for special information gathering
- Detail Statement Printing module with special message printing ability
- Integrable to AMCOR's Business Control System (BCS)

Company Name : **AMCOR COMPUTER CORPORATION**

Headquarters Address : **1900 Plantside Drive, Louisville, KY 40299**

Product Name : **Business Control System**

Number of years commercially available : ~~One (1)~~ **2**

Date of last up-date or improvement : ~~January, 1979~~ **Feb 1980**

Approximate number of current users : ~~25~~ **50**

Purchase price if available on in-house equipment : ~~\$14,000~~ **\$19,500**

Type(s) of equipment compatible for in-house use : **Digital Equipment Corporation PDP 11 series under RSTS/E**

Headquarters contact : **Robert G. Bearden** Telephone No.: **(502) 491-9820**

## General Description

AMCOR's on-line, interactive Business Control System (BCS) incorporates automation for Order Processing, Invoicing, Inventory Control and Sales Analysis. The Business Control System provides management with the reporting required to effectively make sound business decisions based on timely, accurate information available upon demand. Written in Basic-Plus for DEC's PDP-11 family of RSTS/E based computers, the BCS was developed thru the use of an AMCOR developed DBMS tool and through Schema control provides flexibility and modification ease.

- User Oriented (ease of operation - conversational mode)
- Good Accuracy/Audit control
- Multi-levels of detailed documentation at both the user and technical levels
- Installation support and training available
- State of the Art product as a direct result of AMCOR's continuing enhancement program for all products
- On-line, interactive terminal processing
- Complete audit trails
- Complete Maintenance facilities
- Demonstration System available upon request
- On-line editing and validation

## Special Features

- Designed for non-technical operational personnel (People-Oriented)
- Transaction control logs
- Inquiry Capabilities
- Multi-user terminal operation
- Full complement of Sales Analysis and Inventory Control Management reports
- Automatic open order, back order, future order invoicing control
- Automatic updates against A/R, inventory and sales analysis
- Industry independent
- Menu selection
- Proof lists
- Flexible Reporting Modules
- Stand-alone or integrated inventory control module
- Integrated to AMCOR's Accounts Receivable System for customer information validation and control
- Automatic Inventory Commitment against available to sell quantities

Date: **July, 1979**

Submitted By: **Jim Sexton, V.P. of Computer Operation**



Company Name : **AMCOR COMPUTER CORPORATION**

Headquarters Address : **1900 Plantside Drive, Louisville, KY 40299**

Product Name : **General Ledger**

Number of years commercially available : **Five (5)**

Date of last up-date or improvement : **January, 1978**

Approximate number of current users : **75**

Purchase price if available on in-house equipment : **\$3,800**

Type(s) of equipment compatible for in-house use : **Digital Equipment Corporation PDP 11 series under RSTS/E**

Headquarters contact : **Robert G. Bearden**

Telephone No.: **(502) 491-9820**

### **General Description**

AMCOR's on-line, Interactive General Ledger System provides management with the information to make decisions which have a definite impact based on accurate information. Written in Basic-Plus for DEC's PDP-11 family of RSTS/E based computers.

- User Oriented (ease of operation - conversational mode)
- Good Accuracy/Audit control
- Multi-levels of detailed documentation at both the user and technical levels
- Installation support and training available
- On-line, interactive terminal processing
- Complete audit trails
- Complete Maintenance facilities
- Demonstration System available upon request
- On-line editing and validation

### **Special Features**

- Trial Balance
- Balance Sheet
- Income Statement
- General Ledger
- User defined supporting schedules creation capability
- Comparative Reporting using historical data for previous year by defined periods



Company Name : **AMCOR COMPUTER CORPORATION**

Headquarters Address : **1900 Plantside Drive, Louisville, KY 40299**

Product Name : **Payroll**

Number of years commercially available : **Five (5)**

Date of last up-date or improvement : **January, 1979**

Approximate number of current users : **50**

Purchase price if available on in-house equipment : **\$3,800**

Type(s) of equipment compatible for in-house use : **Digital Equipment Corporation PDP 11 series under RSTS/E**

Headquarters contact : **Robert G. Bearden** Telephone No.: **(502) 491-9820**

### General Description

AMCOR's on-line, interactive Payroll System is designed to compensate all levels and types of employees for services rendered. It insures Management efficient and reliable control of the Payroll operation. Written in Basic-Plus for DEC's PDP-11 family of RSTS/E based computers.

- User Oriented (ease of operation - conversational mode)
- Good Accuracy/Audit control
- Multi-levels of detailed documentation at both the user and technical levels
- Installation support and training available
- State of the Art product as a direct result of AMCOR's continuing enhancement program for all products
- On-line, Interactive terminal processing
- Complete audit trails
- Complete Maintenance facilities
- Demonstration System available upon request
- On-line editing and validation

### Special Features

- Entry correction capability
- Pay-rate override feature
- Entry proof registers
- Multiple pay checks per employee, per period capability
- Meets ERISA reporting requirements
- Federal, State, County, local tax processing liabilities supported
- Automatic W2's and state 941-A's, where required
- Check Register
- Deduction registers
- Mass change capability for standard employee deductions
- Supports multi-pay frequencies
- Multi-pay types
- Union Payroll capability
- Departmental processing
- Employee Loan Processing
- Comprehensive Reporting module
- Supports multiple state and local taxing authorities
- M-T-D, Q-T-D, Y-T-D Reporting and Control
- Labor Distribution Reporting
- User-defined company standard deductions
- Employee Data Sheets and Earning Reports

Date: **July, 1979**

Submitted By: **Jim Sexton, V.P. of Computer Operation**



Company Name : **AVCO COMPUTER SERVICES**

Headquarters Address : **201 Lowell Street, Wilmington, MA 01887**

Product Name : **SIMPLAN**

Number of years commercially available : **Two (2)**

Date of last up-date or improvement : **September, 1978**

Approximate number of current users : **750**

Purchase price if available on in-house equipment : **\$37,500**

Type(s) of equipment compatible for in-house use : **IBM**

Headquarters contact : **Lawrence B. Snell** Telephone No.: **(617) 729-7700**

### General Description

**SIMPLAN\*** is a system which supports the financial planning and budgeting functions of commercial and government organizations. **SIMPLAN** puts the power of a large computing system under the direct control of professional planners, financial analysts, marketing analysts and business managers. **SIMPLAN** eliminates the need for computer specialists to go between the computer and the end-user.

The **SIMPLAN** system provides the user with a complete set of functions and facilities for entering, storing, manipulating, and reporting time series data. Data can be entered or updated either interactively or through a batch run. Data is identified by user-specified names and stored in a **SIMPLAN** database. When the data is needed for a model or report, the user callw for it by its name. **SIMPLAN** provides the user with a variety of standard forecasting, statistical, econometric, financial, and arithmetic functions, as well as an equation-oriented modeling language. Reports in almost any format are easy for the user to obtain, using the **SIMPLAN** report generator. To help the user specify and change the models and report definitions, **SIMPLAN** has a flexible text editor. Models may be solved either recursively or simultaneously.

Typical applications of **SIMPLAN** are:

- Cost allocation modeling
- Capital budgeting
- Cash planning
- Budget consolidation
- Sales forecasting
- Econometric modeling

\***SIMPLAN** is a copyrighted computer software system of SSI.

### Special Features

- **DATABASE** - Models and reports refer to a single, common source of data, resulting in simpler data entry, easier data management, faster development of models and report programs and greater user confidence in the outputs.
- **SECURITY** - Data, models, and report programs can be protected against unauthorized access.
- **INTERACTIVE OR BATCH** - Data, models, and report programs can be entered and tested quickly in the interactive mode and then operated on routinely in the batch mode.
- **INTERFACE TO OTHER SYSTEMS** - User-written programs can be used by **SIMPLAN** models; user-written programs can access and update **SIMPLAN** databases.
- **GRAPHICS** - A user can produce plots of professional quality by using a variety of options such as logarithmic scales, interpolations, ratios, labeling and titles.



Company Name : **CALLDATA SYSTEMS, INC., A Subsidiary of Grumman Data Systems**

Headquarters Address : **20 Crossways Park North, Woodbury, NY 11797**

Product Name : **CallPlan™**

Number of years commercially available : **3 years**

Date of last up-date or improvement : **Continuous**

Approximate number of current users : **100**

Purchase price if available on in-house equipment : **\$44,000**

Type(s) of equipment compatible for in-house use : **IBM 370, Amdahl 470**

Headquarters contact : **Wait Winfree, Assistant Director**

Telephone No.: **(516) 575-6407**

## General Description

**CallPlan™** is a state-of-the-art accounting tool for processing reports, and analyzing business information. **CallPlan™** has been designed from the user's point of view for use by accounting managers who may not have had computer related experience.

**CallPlan™** is extremely powerful. This coupled with its English-like statement orientation provides a system of unparalleled importance, flexibility and usability.

**CallPlan™** reports are produced according to user specified formats and criteria or by defaulted rules. Both format and analysis statements may be altered instantly to satisfy changing requirements or to investigate alternative options, without altering the original versions of the model.

**CallPlan™** will also appeal to the more sophisticated users of time-sharing because of the ability to perform higher level functions. It is a truly complete and dynamic tool allowing the user to satisfy all requirements for model building, execution, debugging and editing directly within the **CallPlan™** control environment. In addition, data files may also be created directly from within **CallPlan™**. The control environment also supports the full set of IBM 370 VM/CMS subset commands. Furthermore, **CallPlan™** provides a news feature and a version number so that the user will know what's happening.

Some common applications areas are: P&L, Balance Sheet, Cash Flow, Sales Commission Planning, Pricing Analysis, Proformas, Consolidations, New Product Planning and Analysis, etc.

## Special Features

- Built-in calculation & business functions
- Security of models & data
- Graphical & tabular reporting
- Powerful debugging capabilities
- Production run environment
- Automatic consolidation
- User subprogram capability
- Automatic row/column definition for fast spread sheet analysis
- User defined interactive queries

- WHAT-IF analysis
- Multi-report processing & cross-report data referencing
- Conditional & non-sequential rules processing
- Logic table capability
- Variable model statements
- Built-in editor
- Programmable command files
- Consolidation techniques: seven (7)
- Input forms generation
- Re-run without compiling entire model

Date: **July, 1979**

Submitted By: **Walter Winfree, Assistant Director of Marketing**





Company Name : COMPUTER SHARING SERVICES, INC.  
Headquarters Address : 2498 West Second Ave., Denver, CO 80223

Product Name : FAS (Financial Analysis System)  
Number of years commercially available : Two (2)  
Date of last up-date or improvement : January, 1979  
Approximate number of current users : n.a.  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Dan Walkovitz Telephone No.: (303) 934-2381

## General Description

FAS enables executives to evaluate the effects of alternative business decisions while developing their operating strategies. The system prepares integrated financial forecasts utilizing accounting data as well as statistical and operating information.

- FAS provides accounting integrity through debit/credit logic, double entry bookkeeping controls, and accrual basis statements. This is maintained throughout the entire forecast.
- Financial forecasts are generated with integrated balance sheet, income statement, cash flow statement, and statistical report. Any other reports desired by the user may be produced in addition to these.
- FAS is designed to be used by financial executives and others familiar with accounting concepts. Data processing expertise is not necessary.
- Forecasts consistent with an organization's current reporting practices may be prepared. SEC and AICPA guidelines may also be met. Bottom-up or top-down planning styles can be accommodated.
- The debit/credit transactional forecasting capabilities provide flexibility to accommodate complex and sophisticated forecast methods. At the same time, results are reduced to simple and realistic financial effects.
- The system facilitates "what if" planning exercises used to provide information for management decision-making.
- Accurate cash receipts and disbursements information is produced, so that periods of excess or deficiency may be highlighted and reported.

## Special Features

- Annual budgets may be prepared and updated through FAS. Rolling forecasts where actual results replace forecasted ones as the year progresses may also be produced.
- FAS can project non-financial accounts, such as unit sales and inventory quantities.
- Financial planning reports may utilize historical information, econometric data, specific management judgments, and other data.
- Historical data stored in the FRS (Financial Reporting System) database may be accessed automatically through FAS to produce forecasts and update rolling budgets.



Company Name : COMPUTER SHARING SERVICES, INC.

Headquarters Address : 2498 West Second Ave., Denver, CO 80223

Product Name : FRS (Financial Reporting System)

Number of years commercially available : 1½

Date of last up-date or improvement : January, 1979

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Dan Walkovitz

Telephone No.: (303) 934-2381

### General Description

FRS is a financial consolidation and management reporting system which provides executives with meaningful financial reports on a timely basis. FRS allows a company to build a database of financial and accounting information from prior periods and to collect, consolidate, and report on current information.

- Built-in accounting integrity is maintained throughout the program, from data entry through calculation and final reporting. This is implemented by extensive balancing, comparisons, and cross-referencing. The audit trail maintains a complete record of adjusting and eliminating entries, which are then reflected in the consolidated financial statement.
- FRS is designed to be used directly by accounting personnel. The system itself and control over the timeliness of the reports is in the hands of the people directly responsible for them and not dependent on the schedules of intermediate data processing personnel.
- Implementation is simple. It is accomplished by the completion of a series of specification sheets.
- All the reports produced by FRS are customized to suit your organization. All types of financial and non-financial information may be utilized by the system and presented in your reports. Graphics may even be used to display your data.
- FRS has a large capacity — up to 2000 accounts, with any combination of financial and statistical accounts. There may be up to 999 companies in your file, with no limit to the number of consolidations and sub-consolidations that may be performed on the data.

### Special Features

- Information may be entered into the FRS system directly from widely dispersed, local offices, or from a central location.
- Data may be reconsolidated by product lines, geographical areas, or any other criterion without re-entry of information or costly manipulations.
- A companion system, FAS, is fully integrated with FRS to provide forecast capabilities. FAS produces financial planning reports which may utilize historical data, econometric information, specific management judgments, and other data. FAS facilitates "what if" planning exercises to provide information for management decisions.

Date: July, 1979

Submitted By: Patricia A. Lang, Manager - Image Creation



Company Name : **CONSTRUCTION COMPUTER CONTROL CORPORATION**

Headquarters Address : **615 East Michigan Street, Milwaukee, WI 53202**

Product Name : **SYSTEM FIVE**

Number of years commercially available : **Nine (9)**

Date of last up-date or improvement : **Continuous**

Approximate number of current users : **150**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **William C. Koenig**

(800) 558-9018  
(414) 278-0500  
Telephone No.: (312) 372-2758

### General Description

SYSTEM FIVE is a management and accounting system for contractors employing 20 to 2,000 people. SYSTEM FIVE is operated from a terminal in the contractor's office. The terminal is connected by telephone lines to the SYSTEM FIVE computers. The services is an economical, easy-to-use, time-saving answer to simplify the control of jobs, and improve construction company management. Reports are CPA-designed and used by all types of contractors throughout the U.S. since 1969.

SYSTEM FIVE is easy to operate and requires no formal training. A clerk simply types significant data on the terminal located in the user's office. Information automatically feeds into the computer over toll-free telephone lines. Data is typed from invoices, time cards, change orders, new contracts, billings, cash receipts, etc.

#### REPORTS AVAILABLE:

- Job Analysis
- Hours Analysis
- President's Reports
- Job History
- Heavy + Highway Analysis
- Special Job Analysis
- Payroll
- Aged Accounts Receivable & Payable
- Historical Receivables & Payable
- Journals
- General Ledger
- Auditor's Ledger
- Balance Sheet & Income Statement
- Capital Equipment, Location, Cost & Income Reports

### Special Features

- Customize information to tell a contractor what is happening in his construction business.
- Reduce excessive time spent on payroll and job cost preparation.
- Measure and evaluate performance and profitability of individual jobs, types of work, including that of executive and divisions.
- Control outstanding accounts payable and receivable.
- Manage and plan cash requirements.
- Front-end-load projects without distorting job or financial reports.
- Easily prepare accurate, completed-contract, and percentage of-completion financial statements for the same company.
- Allocate overhead expenses accurately to different types of jobs being done in different areas.
- Analyze and control profit centers and divisions within the company.

Company Name : **DATALOGICS, INC.**

Headquarters Address : **University Circle Research Center, 11001 Cedar Ave., Cleveland, OH 44106**

Product Name : **DATALOGICS FINANCIAL ACCOUNTING SYSTEM (DL/FAS)**

Number of years commercially available : **3**

Date of last up-date or improvement : **Continuous**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **Negotiable**

Type(s) of equipment compatible for in-house use : **Any COBOL system with terminal input**

Headquarters contact : **Thomas J. Madden** Telephone No.: **(216) 229-1300**

## General Description

A totally integrated Accounting and Financial system consisting of interfacing or stand alone modules of General Ledger, Accounts Receivable, Sales Analysis, Accounts Payable, Check Reconciliation, and Fixed assets. Functioning as a management tool, the system collects, organizes, stores, and presents both accounting and operating information in a meaningful form so that actions can be based on relevant, timely, accurate information.

The General Ledger module, in addition to producing the standard accounting reports and financial statements, measures the performance of individual organizations, products, or other units, and provides a comparison scale such as plans, budgets, past performance, and other standards. The system can quantify the possible impact of alternative future actions and measure the success of those actions once taken. Includes extensive sub-systems for flexible budgeting, cost allocations, consolidations, automated planning projections, automated year-end closing, and transaction generation.

The Accounts Receivable and Sales Analysis modules are flexible management tools which provide a method for recording receivables data and collecting outstanding items as well as providing a comprehensive means of reporting sales analysis history. Accounts Payable and Fixed Asset Modules are also included.

## Special Features

- No predetermined numbering structure
- Flexible method of forecasting and measuring financial progress
- Reporting for financial data at multiple levels for multiple companies
- Comprehensive editing and audit trail
- Flexible report formatting
- Interactive data entry routines tailored to individual company's specifications
- System will operate in remote batch, CRJE, or on a service basis



Company Name : DATALOGICS, INC.  
Headquarters Address : University Circle Research Center, 11001 Cedar Ave., Cleveland, OH 44106

Product Name : IMPACS - Integrated Municipal Planning, Accounting & Control System  
Number of years commercially available : 4  
Date of last up-date or improvement : Continuous  
Approximate number of current users : n.a.  
Purchase price if available on in-house equipment : Negotiable  
Type(s) of equipment compatible for in-house use : Any time-sharing system  
Headquarters contact : Thomas J. Madden Telephone No.: (216) 229-1300

## General Description

The IMPACS system is a comprehensive, modular, on-line system which is designed to have flexibility to meet the needs of the individual municipality financial manager. It provides ease of input and timely reporting for payroll, revenue analysis, fund accounting, vendor control, and budget responsibility. Normal outputs include paychecks, vendor checks, bank reconciliations, incumbrance reports, payment approval lists, transaction and detail ledgers, income statements, and balance sheets. The system is designed to run in parallel with municipality operations with reporting on demand to coincide with council meetings or any other schedule desired. Users are in total control of the system and may input data and generate reports at their convenience rather than on a scheduled basis.

## Special Features

- Whenever possible, reports are in the form to be entered directly into the minute books or official records with spaces for signatures and officials' names and titles supplied on the document.
- Payroll rates may be different for the same person if that person is being paid out of different operating funds or different departments in the municipality.
- System generates graphic display of budget responsibility in order to highlight the performance of the operating departments.



Company Name : GENERAL ELECTRIC INFORMATION SERVICES COMPANY

Headquarters Address : 401 N. Washington St., Rockville, MD 20850

Product Name : GEPAY\$

Number of years commercially available : Four (4)

Date of last up-date or improvement : 1978

Approximate number of current users : 200

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : J. M. Loughry, III

Telephone No.: (301) 340-5199

## General Description

All the benefits of computerized payroll processing are available through GEPAY\$, a generalized payroll system offered by General Electric Information Services Company.

GEPAY\$ works best for businesses and organizations with 1000 or less employees. It offers particular advantages to the following types of potential users:

- Businesses now using CPA or accounting firms to maintain and process their payroll.
- Firms with high turn-over of personnel, thus requiring paychecks on an unscheduled basis.
- Firms processing their own payroll, but needing faster turn-around on the job.
- Companies with geographically scattered locations, each location with local employees and local tax deductions, but with one central payroll function.

## Special Features

GEPAY\$ provides these important payroll-preparation features:

- Automatic calculation of regular gross pay, overtime and shift premium pay, and taxes (federal, state, and local).
- Automatic payroll check writing.
- Flexibility in handling special deductions, vacation payments, and the like.
- Automatic calculation and printing of 941A and W-2 statements.
- Direct on-line inquiry capability to determine each employee's year-to-date pay, deductions, taxes, and so forth.
- An exception payroll calculation option for processing the payroll on the basis of changes in employee pay level or hours worked instead of creating individual payment transactions for each employee.
- Seven comprehensive reports.





Company Name : GENERAL ELECTRIC INFORMATION SERVICES COMPANY

Headquarters Address : 401 N. Washington St., Rockville, MD 20850

Product Name : GFAST\$

Number of years commercially available : Four (4)

Date of last up-date or improvement : 1976

Approximate number of current users : Over 100

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : J. M. Loughry, III

Telephone No.: (301) 340-5199

## General Description

GFAST\$ is a fast and flexible system that is designed to completely automate a user's general ledger accounting functions.

GFAST\$ is available for any business or accounting firm that does general work for clients ("clients" may be paying customers, cost centers, departments within a business or the business itself). Specifically:

- Accounting and CPA firms that want to provide their clients with faster, more efficient general ledger services.
- Accounting departments of businesses that want to streamline growing ledger work loads and have the convenience of an additional auditing tool.
- Small businesses that want an accurate, economical general ledger accounting system.

## Special Features

Interactive users get many special features and options in GFAST\$, such as:

- The income statement and balance sheet account range may be variable.
- Users may get either or both detailed general ledger and trial balance listings.
- Current period and year-to-date totals with or without percentages of total net sales.



Company Name : **METROCOM INC.**

Headquarters Address : **1500 Southern Nat'l Center, 200 S. College St., Charlotte, N.C. 28202**

Product Name : **POSITION**

Number of years commercially available : **5**

Date of last up-date or improvement : **January, 1977**

Approximate number of current users : **65**

Purchase price if available on in-house equipment : **Available on request**

Type(s) of equipment compatible for in-house use : **Any system utilizing Fortran V**

Headquarters contact : **E. E. Mason** Telephone No.: **(704) 374-1990**

### **General Description**

In order to incorporate maximum cost effectiveness and operations efficiency, this package blends together the natural functions and components of an accounting system.

The criteria for its inception acknowledges the impetus of the day-to-day activities of record keeping while recognizing and maintaining the premise of cost control, which is normally lacking in most time-sharing bases systems due to the "pay for what you use" theory. All input is keyed daily on to magnetic cassette tape resident in an intelligent terminal. The terminal then performs editing, batch tallying, account verification, and totaling functions, all at the fixed monthly rental cost of the terminal. After rewriting the corrected tape, verified input is transmitted to the time-sharing computer site where the bulk of the processing and execution is performed.

The accounting system journalizes each type of transaction by category as follows: Payroll; Accounts Payable; Accounts Receivable; Standard Ledger Transactions (such as Depreciation).

These "sub-functions" are performed individually and exclusive of each other until month-end when, at the user's discretion, they are combined as input to the general ledger. Reports, output, and status of each function may be obtained as often as desired.

### **Special Features**

The Payroll system is capable of performing various job allocations and distributions including the complexities of construction accounting and costing. Additionally, it may process such diverse exceptions as employee loans or other intermittent deductions.

General Ledger processing facilitates comparisons to budgeted data on a monthly, quarterly, or annual basis. Individual or consolidated income statements may also be generated.



Company Name : NATIONAL CSS, INC.  
Headquarters Address : 187 Danbury Road, Wilton, CT 06897

Product Name : Business Accounting Systems (BAS)  
Number of years commercially available : 4  
Date of last up-date or improvement : March, 1977  
Approximate number of current users : 55  
Purchase price if available on in-house equipment : Available on NCSS network only  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Manager of Business Accounting Systems Telephone No.: (203) 762-2511

## General Description

Business Accounting Systems (BAS) is a library of programs, which, when selectively grouped together, provides the most efficient approach to your accounting requirements. The modular concept of BAS is designed to fit your business environment without imposing the restrictions of a prepackaged system. Although fully developed, the operation of the system is tailored to your needs: existing forms can be used for data entry; current procedures can be accommodated; special report formats can be specified.

The basic BAS library consists of three modules: General Ledger, Accounts Payable, and Accounts Receivable. These modules, developed in accordance with generally accepted accounting principles, provide complete audit trails, user-controlled accounting periods, and interactive data manipulation. These modules are capable of standing alone or operating in an integrated environment.

The automated financial reporting capability offered by the General Ledger module facilitates your month-end closing. Consolidated Income Statement, Budgetary and comparative financial reporting, provide increased control.

The Accounts Payable System is a voucher payables system that is capable of check production and full reporting of vouchered and paid invoices. Accounts Receivable is an open item Accounts Receivable System that contains an on-line credit inquiry feature, allowing you to check the current status of any customer's account.

## Special Features

BAS provides the basis for satisfying changes in your company's operating and reporting requirements. The BAS software operating on the National CSS network will not only satisfy your basic accounting needs but will actually help you improve your operations.



Company Name : NATIONAL CSS, INC  
Headquarters Address : 187 Danbury Road, Wilton, CT 06897

Product Name : Business Accounting Systems (BAS) - Accounts Payable  
Number of years commercially available : 4  
Date of last up-date or improvement : March, 1977  
Approximate number of current users : 55  
Purchase price if available on in-house equipment : Available on NCSS network only  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Manager of Business Accounting Systems Telephone No.: (203) 762-2511

### General Description

The BAS Accounts Payable module is a flexible, general purpose library of programs which provides the user with automated procedures for managing his accounts payable. Operation of the system is oriented to the user's own specific accounting requirements, procedures, and personnel and does not require any prior knowledge of computers or programming.

BAS Accounts Payable is a voucher driven system. Vouchers may include multiple account distributions for tracking expenses by division, department, cost center, project, etc. The user may define his own periods for aging open item vouchers and producing cash requirements forecasts.

Vendor accounts are controlled by two primary system audit trails. The accounts payable "Transaction Register" shows all voucher activity for each vendor with his opening and closing balances. The "Settlement Register" recaps in detail, payments made to vendors for a given period.

BAS check writing and control features are unique. Checks can be generated automatically either at the user's console or the NCSS line printer. The operator chooses the payment period and has the option of selecting certain open items for inclusion or exclusion from the check run.

### Special Features

**VENDORS** - Complete name, address, and federal 1099 information is kept for all permanent vendors. Special onetime vendors require only minimum information for check writing. Vendor listings are available in sequence by vendor number, name or zip code.

**CHECK FACILITY** - The check writer has a complete restart capability and automatically voids and tracks bad checks. Numerical control of all checks including handwritten checks is provided by the system through detail and summary check registers. Additionally, the user may control payments by bank and generate bank reconciliation reports on tape or cards.

**GENERAL LEDGER INTERFACE** - If the user also utilizes the BAS General Ledger, the accounts payable system will validate all voucher distributions and automatically generate general ledger transactions. The distribution register reports recap G/L expense distributions for a period in summary or detail.



Company Name	: NATIONAL CSS, INC.	
Headquarters Address	: 187 Danbury Road, Wilton, CT 06897	
Product Name	: Business Accounting Systems (BAS) - Accounts Receivable	
Number of years commercially available	: 4	
Date of last up-date or improvement	: March, 1977	
Approximate number of current users	: 55	
Purchase price if available on in-house equipment	: Available on NCSS network only	
Type(s) of equipment compatible for in-house use	: n.a.	
Headquarters contact	: Manager of Business Accounting Systems	Telephone No.: (203) 762-2511

### General Description

The BAS Accounts Receivable module is a flexible, general purpose library of programs which provides the user with automated procedures for managing his accounts receivables. Operation of the system is oriented to the user's own specific accounting requirements, procedures, and personnel and does not require any prior knowledge of computers or programming.

Customer accounts are controlled by two primary system audit trails. The accounts receivable "Transaction Register" shows all invoice activity for each customer with his opening and closing balances. The "A/R Aging Report" recaps in detail all open invoices and associated cash and/or adjustments for a given period.

All invoices in the BAS Accounts Receivable System are uniquely identified by a number, and cash and/or adjustments are then applied using this number. The user has total control over which invoice will or will not be closed out. Invoice, Cash, Deduction, and other Adjustment Registers recap the monthly activity.

### Special Features

**CUSTOMERS** - Complete bill-to and ship-to names, address and credit information is kept for all customers. Customer listings are available in sequence by customer number, name, or zip code, as well as mailing labels.

**CREDIT INQUIRY** - Online credit inquiry is a fast, efficient method for tracking a particular customer's activity for a given period. The selected customer's current name, address, credit limit, aged open invoices, and detail activity is displayed on the user's console.

**STATEMENT FACILITY** - BAS statement writing and control features are unique. Statements can be generated automatically either at the user's console, or the NCSS line printer. The operator chooses those customers who are to receive statements based on specified selection criteria.



Company Name : NATIONAL CSS, INC.  
Headquarters Address : 187 Danbury Road, Wilton, CT 06897

Product Name : Business Accounting Systems (BAS) - General Ledger  
Number of years commercially available : 4  
Date of last up-date or improvement : March, 1977  
Approximate number of current users : 55  
Purchase price if available on in-house equipment : Available on NCSS network only  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Manager of Business Accounting Systems Telephone No.: (203) 762-2511

### General Description

The BAS General Ledger module is a flexible general purpose library of programs which provides the user with automated procedures for maintaining his general ledger and producing financial reports. Operation of the system is oriented to the user's own specific accounting requirements, procedures, and personnel and does not require any prior knowledge of computers or programming

Account distribution allows the user to define division, account, sub-account and department for all balance sheet and operating statement accounts. The sub-account and department fields provide capabilities for tracking account activity by project, department, cost center, profit center, etc. Control accounts are available for grouping detail accounts, report headings, totals and subtotals that the user wishes to see on his financial reports. Memo accounts may be included to track account related activities such as quantity of sales, units shipped, occupancy levels, and headcount.

The BAS accounting period is defined uniquely in terms of a period number and period ending date, totally controlled by the user to match his specifications: 12 fiscal months, 13 fiscal months, 4 quarters, etc.

### Special Features

**VALIDATION OF INPUT** - Once the source transactions have been entered to the system, the user has the option of validating those transactions immediately, while the source is still fresh in the operator's mind.

**FINANCIAL REPORTING** - Besides producing completely formatted balance sheet and operating statement reports for any executive level, BAS maintains history of up to 26 periods to produce comparative operating statements.

**BUDGETING** - The BAS module has a complete budgeting capability at both the divisional and departmental level. Budget variance reports are available for current or comparative analysis. Budget projections may be made automatically from previous performance.



Company Name : ON-LINE SYSTEMS, INC.

Headquarters Address : 115 Evergreen Heights Drive, Pittsburgh, PA 15229

Product Name : ORBIS (On-Line's Resource Budgeting Information System)

Number of years commercially available : One (1)

Date of last up-date or improvement : January, 1979

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Don C. Tarkenton

Telephone No.: (412) 931-7600

## General Description

ORBIS is a comprehensive financial planning and budgeting system designed to operate in both time-sharing and batch environments. The fully integrated system encompasses three different budgeting techniques: conventional, program, and zero-base budgeting. An ORBIS application can utilize any of the budgeting processes, singularly or in combination, to meet the specific requirements of the user. ORBIS consists of several modules, including:

**SETUP** - Uses a series of easily answered questions to quickly and easily define a user's system.

**DATA ENTRY** - Interactive data entry through CRT screens provides immediate validation of data to ensure data base integrity.

**PERSONNEL PLANNING** - Allocates human resources to budget activities and automatically calculates the salary accounts.

**RANKING** - Allows the zero-base budgeting user to prioritize decision packages and assign cut off levels.

**CONSOLIDATION** - Budget requests may be consolidated at successively higher levels of management as an aid in decision making.

**PHASING** - Allows data to be moved forward or backward in time.

**REPORTING** - A number of standard reports and a powerful and flexible report generator provide the user with extensive reporting capabilities.

**MONITORING** - Provides performance analysis by comparing budgeted, actual, and forecasted figures.

## Special Features

- Available for interactive or batch mode processing
- English command language requires no previous computer knowledge
- Extensive validation procedures provide data base integrity
- "What if" capability in all modules allows testing of data before it is actually posted to the data base
- Audit trails throughout allow easy restoration of previous states of the data base
- Operator identification numbers and record passwords allow management control over data base security
- Interface with in-house general ledger and accounting systems
- Complete documentation, training, and technical support
- Interfaces to OLS systems for graphics, financial modeling, statistics, and project management



Company Name : **PRYOR CORPORATION**

Headquarters Address : **400 N. Michigan Avenue, Chicago, IL 60611**

Product Name : **On Line Manufacturing System for Chemical Manufacturers**

Number of years commercially available : **2**

Date of last up-date or improvement : **June, 1977**

Approximate number of current users : **20**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **William B. Martin**

Telephone No.: **(312) 644-5650**

## General Description

### ON LINE MANUFACTURING ORDER PROCESSING, COST ACCOUNTING AND INVENTORY CONTROL SYSTEM FOR CHEMICAL MANUFACTURERS:

- Allows for the on-line entry and maintenance of all products and formula (bill of Material) master records and costs.
- Upon receipt of a raw material, the quantity, and actual cost are entered on-line. This automatically updates inventory records, actual costs and reports on cost variations from standards.
- Manufacturing Orders are entered into the system with the equipment to be used and the due date. A Manufacturing Order is automatically prepared and recorded for each item to be produced and raw materials reserved. Open orders are then available for reporting and accumulating actual costs as they are incurred.
- When a Manufacturing Order is completed, either a detail or a summary report is prepared on your terminal showing the entire order and all variations in costs and materials and comparing actual costs in both material and labor to standards.
- Automatic On-Line Inventory Exception Reporting is available.
- Raw material cost changes can be entered at any time, formulas recosted, and a report prepared on your terminal in minutes.
- Physical inventory counts can be entered for either the current or preceeding month. Inventory cost and value Reports are prepared upon demand.
- A record of every inventory transaction processed is kept on-line to prepare monthly detail reports such as an Inventory Audit Trail, and Purchases by Vendor Report, etc. This data is also available for future processing to help establish and adjust safety stock, reorder points, etc.
- Large month-end reports such as Inventory Control and Product Movement Reports are automatically prepared on our high speed printer for delivery.

## Special Features

- This is a parameterized system which allows customized systems to be implemented with a minimum of custom programming effort.
- Each user is totally independent, both in terms of the design of his data base and in the application of the order processing system to his plant.
- Aside from the security codes we provide, each user can also place and alter at will his own security codes on sensitive data bases.
- Any data stored about an item is available in a report format selected or designed by each user for immediate printing either on his terminal or on our high speed printer for delivery.





Company Name : PRYOR CORPORATION

Headquarters Address : 400 North Michigan Avenue, Chicago, IL 60611

Product Name : RC/BASIC

Number of years commercially available : 4

Date of last up-date or improvement : June, 1977

Approximate number of current users : 55

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Bill Martin

Telephone No.: (312) 644-5650

### General Description

#### RC/BASIC - ON-LINE BILLING, ACCOUNTS RECEIVABLE, SALES ANALYSIS AND INVENTORY CONTROL:

A regular billing clerk with very little training from us can perform on-line daily order entry, invoicing, accounts receivable, inventory control and sales analysis from your office.

Minimum customer and order data is entered through your terminal. Each order is edited, priced, printed, inventory reserved and placed into an open order file. Entry of the date of shipment, carrier used, etc. along with any changes, releases the order from the open order file and automatically costs, extends and prints invoices while posting accounts receivable, sales and inventory. You automatically get an invoice register as well as an immediate breakdown of total sales and gross profit for both today and month-to-date. Automatic Exception Reporting is also available.

Accounts Receivable Open Item and Inventory Status Reports can be prepared at any time on your terminal for either all or selected customers and products. Each report is as current as the last transaction processed.

Throughout the month, inventory receipts, cash receipts and any other transactions are entered into the system via your terminal to immediately update your master files. At the end of the month, an Accounts Receivable Aged Trial Balance, Statements, Sales Analysis by Customer and Product, Commission, and Inventory Control Reports are automatically generated - partly on your terminal and partly on our high speed printer for immediate delivery to your office.

### Special Features

- This is a parameterized system which allows customized systems to be implemented with a minimum of custom programming effort.
- Each user is totally independent, both in terms of the design of his data base and in the application of the order processing system to his office procedures.
- Aside from the security codes we provide, each user can also place and alter, at will, his own security codes on sensitive data bases.
- Any data stored about a product or customer is available in a report format selected or designed by each user for immediate printing either on his terminal or on our high speed printer for delivery.

Company Name : **STANDARD & POOR'S FIXED INCOME SYSTEMS**

Headquarters Address : **100 California St. - Penthouse, San Francisco, CA 94111**

Product Name : **Fixed Income Management Services (FIMS)**

Number of years commercially available : **Four (4)**

Date of last up-date or improvement : **January, 1979**

Approximate number of current users : **20**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **C. James Reuter** Telephone No.: **(415) 398-4203**

### General Description

An advanced on-line interactive system for fixed income portfolio analysis and control, tailored to the needs of financial institutions

FIMS enables investment managers, controllers and treasurers to have instant access to every data item of significance on the fixed income securities they hold in their portfolios. Summary and detailed information can be retrieved in minutes through the use of desk-top terminals, with either cathode-ray tube or hard copy capability. In addition, a full complement of monthly reports is available for those responsible for portfolio management, accounting and control.

**Centralized data file:** Provides common source of current, accurate information to every user within an institution on all fixed income securities. All accounting data is available to provide maximum detail for decision making and regulatory compliance.

**Current price data:** FIMS users, with the aid of our unique municipal bond market model, can value their portfolios in minutes - an operation that manually can take days or weeks.

**Analytical features:** FIMS allows users to employ a variety of computer analysis techniques to find specific bond swap candidates, evaluate portfolio strategies, and verify accounting information.

**Graph prints:** Portfolio managers can print yield curves to reflect the market place in the past, present or future based on their own economic forecasting.

### Special Features

**Portfolio Valuation:** Update and value portfolio in minutes (past, present, or future)

**Amortization/Accretion:** Select either straight-line or scientific methods and determine correct book values. Track book values on daily, weekly, or monthly basis.

**Income accruals:** Set any two dates and identify income accrued during that period (since the last coupon) or the amount due at the next coupon payment date.

**Search & Select:** Request information on bond fields such as par, cost, coupon, yield, maturity, pledge, security type, etc. and the system identifies the items meeting that criteria. This data is summarized and displayed immediately on the terminal.



**ENGINEERING PROGRAMS**
**Avco Computer Services \***

EZMATH .....	VIII.010
MSC/NASTRAN .....	VIII.011

**Boeing Computer Services Company**

ANSYS .....	VIII.020
BIGS .....	VIII.021
EKSLIB/BCSLIB .....	VIII.022
E <sup>3</sup> SAP .....	VIII.023
GTICES STRUDL .....	VIII.024
MSC/NASTRAN .....	VIII.025
PROJECT/2® .....	VIII.026
SYSTEM 2000 .....	VIII.027
TPIPE .....	VIII.028

**Call Data Systems, Inc.**

ACAP .....	VIII.040
ADLPIPE .....	VIII.041
AMCAP .....	VIII.042
ANSYS .....	VIII.043
CALLSEWR™ .....	VIII.044
COMPACT .....	VIII.045
ITRAC-II .....	VIII.046
MICROPROCESSOR SOFTWARE ..	VIII.047
MIFIL .....	VIII.048
NASTRAN*PLUS .....	VIII.049
PREDICTOR .....	VIII.050
STRAIN .....	VIII.051
STRUDL-II .....	VIII.052
SUPER*SCEPTRE .....	VIII.053
XCOGO .....	VIII.054

**Computer Sciences Corporation**

AAA PROGRAMS .....	VIII.080
ANSYS .....	VIII.081
CSC-TRAC .....	VIII.082

GASP .....	VIII.083
MISTER .....	VIII.084
NASTRAN .....	VIII.085
SDRC PROGRAMS .....	VIII.086
SPRED .....	VIII.087

**McDonnell Douglas Automation Company**

ENGINEERING SERVICES .....	VIII.100
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**National CSS, Inc.**

ACCOS V .....	VIII.120
AGS .....	VIII.121
AMPSYN .....	VIII.122
CADSYN™ .....	VIII.123
COMPACT .....	VIII.124
DEELAY™ .....	VIII.125
FILSYN .....	VIII.126
ISPICE .....	VIII.127
LOGCAP .....	VIII.128
MICROPROC. SUPT. SOFTWARE ..	VIII.129
PROPHECY .....	VIII.130
STRU-PAK .....	VIII.131

**Stoner Associates, Inc.**

GASSS .....	VIII.160
GASUS .....	VIII.161
LIQSS .....	VIII.162
LIQT® .....	VIII.163

**University Computing Company**

ARCH. & HEAT TRANS. LIB. ....	VIII.180
ELECTRIC POWER INDUSTRY LIB.	VIII.181
ELECTRONICS LIBRARY .....	VIII.182
ENGINEERING MGMT. LIBRARY ..	VIII.183
PIPE STRESS LIBRARY .....	VIII.184
PROCESS, CHEMICAL & VESSEL ..	VIII.185
STRUCTURES LIBRARY .....	VIII.186
UCC-APT .....	VIII.187

\*Companies shown in **bold print** are Corporate Members of ACU.





Company Name : AVCO COMPUTER SERVICES  
Headquarters Address : 201 Lowell Street, Wilmington, MA 01887

Product Name : EZMATH  
Number of years commercially available : 2  
Date of last up-date or improvement : July, 1979  
Approximate number of current users : 20  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Stephen G. Marvin  
Telephone No.: (617) 729-7700

### General Description

EZMATH is a graphics program designed to eliminate the typographical problems associated with the presentation of complicated mathematical formulas in formal reports. It accepts as its input almost any mathematical formula in a format which resembles in some ways the FORTRAN representation of mathematical expressions, but is much more general and more directly related to the visual aspects of a formula. It handles subscripts and superscripts, radicals, fractions, integrals, sums, products, column vectors, matrices and determinants without requiring any positional information from the user. In addition to the commonly used mathematical symbols, letters and numerals from the Roman (print or script), Greek, Cyrillic (Russian) and English and German Gothic alphabets can be mixed in any one formula without calls to other routines. Letters can be modified by primes, dots, asterisks, bars, tildes, circumflexes, arrows and underscores and can be standard or bold face type. The EZMATH language was designed to reflect (as much as possible) the visual aspects of a mathematical formula. Thus the user is not required to have a mathematical background.

### Special Features

The program is aimed at improving the visual quality of technical reports while at the same time reducing the labor required to assemble and proof-read complex mathematical formulas. It generates high quality, hard copy output from the Information International FR80 Graphic Recorder which can be readily inserted into a report. The space required for each formula (in terms of typewriter line space) is printed out at the time the formula is processed in the interactive mode.



Company Name : **AVCO COMPUTER SERVICES**

Headquarters Address : **201 Lowell Street, Wilmington, MA 01887**

Product Name : **MSC/NASTRAN**

Number of years commercially available : **7**

Date of last up-date or improvement : **March, 1979**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Francis F. Michaud** Telephone No.: **(617) 729-7700**

### General Description

**MSC/NASTRAN** is a large-scale general purpose program that solves a wide variety of engineering analysis problems by the finite element method. It has been successfully used by large and small companies throughout the world engaged in such diverse fields as automotive, aerospace, civil engineering, energy, shipbuilding, offshore oil, industrial equipment, chemical engineering, optics and government research. Pre-formatted solution sequences are available to conserve user effort for the most commonly required solutions, as listed below:

- Linear Static Analysis (including Inertia relief)
- Static Analysis with Differential Stiffness
- Static Analysis with Large Displacement Geometric Nonlinearity
- Vibration Analysis
- Buckling Analysis
- Direct and Modal Complex Eigenvalue Analysis
- Direct and Modal Frequency Analysis and Random Response
- Direct and Modal Transient Analysis (Including Response Spectral Analysis)
- Linear Static Analysis with Cyclic Symmetry
- Vibrational Analysis with Cyclic Symmetry
- Linear Steady State Heat Transfer
- Nonlinear Steady State Heat Transfer
- Transient Heat Transfer
- Aeroelasticity

**MSC/NASTRAN** is a proprietary product of The MacNeal-Schwendler Corporation.

### Special Features

The library of finite elements available in **MSC/NASTRAN** includes more than fifty finite elements. The elements include one-, two-, and three-dimensional elements, scalar, axisymmetric, rigid, mass, damping, fluid and heat transfer elements.

Other features include:

- Matrix routines designed for the efficient solution of very large problems
- The ability to exploit structural symmetry as a means to reduce costs
- Special aids to help detect errors generated in the input
- Geometry plotting in orthographic, perspective and stereoscopic projections for all elements of the **MSC/NASTRAN** library.



Company Name : **BOEING COMPUTER SERVICES COMPANY**

Headquarters Address : **177 Madison Avenue, Morristown, NJ 07960**

Product Name : **ANSYS\***

Number of years commercially available : **4**

Date of last up-date or improvement : **1979**

Approximate number of current users : **Over 50**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **John Corrie**

Telephone No.: **(206) 575-7066**

## General Description

**ANSYS is a large-scale, general purpose finite element program. It has the following capabilities:**

- **Static stress analysis. Effects of applied loading, plasticity creep, swelling, large deflection and geometric stiffening.**
- **Asymmetrical beam element, laminated shell element, crack-tip element, interface element, and a wave element.**
- **Vibration analysis and seismic or force loading for spectrum analysis.**
- **Harmonic response analysis.**
- **Linear elastic stability (Buckling).**
- **Non-linear transient dynamic analysis for time-history solutions. Mass, damping and stiffness matrices that can vary with time and that can be functions of displacement.**
- **Reduced linear dynamic analysis for time-history response of linear elastic structures.**
- **Heat transfer analysis for steady-state or transient temperature distribution.**
- **Substructure analysis. Restart capability. Unlimited number of elements.**
- **Preprocessing and post-processing options.**

## Special Features

**BCS provides technical support for ANSYS customers. The support staff consists of personnel with structural engineering degrees who are familiar with real-life engineering problems. Staff members are available for consultation on the best solution to a particular problem.**

**Rev. 3 (now available) has interactive run capability, and a reduced core input data checking option. Enhanced capabilities include: hidden line plots, large displacement convergency option, and a twenty node brick for both stress and heat transfer. Also, a wave front re-ordering option for reduced solution time has been added.**

**\*ANSYS is licensed from Swanson Analysis Systems, inc., Houston, PA.**



Company Name : BOEING COMPUTER SERVICES COMPANY

Headquarters Address : 177 Madison Avenue, Morristown, NJ 07960

Product Name : BIGS (BCS Interactive Graphics System)

Number of years commercially available : 4

Date of last up-date or improvement : 1977

Approximate number of current users : Many

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : John Corrie

Telephone No.: (206) 575-7066

### General Description

BIGS is a user oriented system that provides users of low-cost graphic display terminals, an easy, rapid method for making any existing or new FORTRAN program interactive with such terminals. BIGS automatically generates standard-type displays, such as grids, axes, curves, menus, charts, and tables. These displays provide interactivity with the terminal and require no user knowledge of the supporting software. Major capabilities include:

- Easy conversion of existing FORTRAN programs to an interactive environment
- Graphic display of any geometric figure
- Interactive editing of textual and numeric data
- Option selection
- Creation of hardcopy plots of any graphic display
- Graphic display of plotted and symbolic data
- Custom or automatic labeling for grids and axes
- Program control by name
- Display expansion with automatic clipping

### Special Features

- BCS provides experienced technical support in the use of the BIG Systems.
- Optional precompiler converts macro level graphics commands contained in a FORTRAN program.
- Built-in command interpreter provides user control of display process.



Company Name : **BOEING COMPUTER SERVICES COMPANY**

Headquarters Address : **177 Madison Avenue, Morristown, NJ 07960**

Product Name : **EKSLIB/BCSLIB Math Subroutine Library**

Number of years commercially available : **8**

Date of last up-date or improvement : **1978**

Approximate number of current users : **Over 1,000**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **John Corrie**

Telephone No.: **(206) 575-7066**

### General Description

**EKSLIB** is BCS's Math Subroutine Library available on **MAINSTREAM®—EKS** (Control Data Computers) and **BCSLIB** is essentially the same library available on **MAINSTREAM—CTS** and **—TSO** (IBM Computers). The library consists of over 100, high-quality, state-of-the-art, general-purpose mathematical programs developed, maintained and supported by BCS numerical analysis and statisticians. Subroutines are available for most numerical and statistical problems, such as:

- Elementary and special functions.
- Interpolatives, approximation and transformation.
- Linear algebra and matrix operations.
- Statistics and probability, including random-number generators, probability distribution, hypothesis testing and regression analysis.
- Polynomials and nonlinear equations.
- Numerical calculus, numerical quadrature and ordinary differential equations.

These subroutines are clearly documented, easily accessed, efficient and accurate. The library is automatically accessed at load time by any job, whether via batch or terminal.

### Special Features

**EKSLIB/BCSLIB** are fully supported and maintained BCS products. The library staff consists of professional mathematicians and programmers with extensive industrial experience who are continually adding improvements in capability. A staff which includes over 30 Ph. D mathematicians, statisticians, and computer scientists provides a consultation service on mathematical and statistical software, and maintains a large quantity of state-of-the-art software subroutines and packages in addition to the subroutine libraries. This additional software includes quality software in optimization (with constraints), special functions, eigen analysis, linear programming, spline curve and surface fitting (and smoothing), statistics, graphics, and special packages for the solution of partial differential equations. A quarterly newsletter which lists current software capabilities, is available upon request.



Company Name : BOEING COMPUTER SERVICES COMPANY

Headquarters Address : 177 Madison Avenue, Morristown, NJ 07960

Product Name : E<sup>3</sup>SAP

Number of years commercially available : 5

Date of last up-date or improvement : 1978

Approximate number of current users : 50

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : John Corrie

Telephone No.: (206) 575-7066

### General Description

E<sup>3</sup>SAP is a linear static and dynamic finite element program that was originally developed as SAP IV at the University of California, Berkeley. It has the following capabilities:

- Static stress analysis, including effects of concentrated loads, pressure and hydrostatic loading, inertia loads, thermally induced, and specified displacements.
- Natural frequency and mode shape determination.
- Response spectrum analysis (for earthquake shock studies).
- Time history response to arbitrary force or acceleration functions.
- Skewed boundary degrees of freedom.
- Orthotropic, isentropic, and temperature dependent material properties for a number of situations.
- Theoretical derivations assuming linear and reversible materials.

### Special Features

BCS has extensively modified E<sup>3</sup>SAP in order to implement several user-oriented features:

- Cylindrical and spherical coordinate generation with optional local axis and origin.
- Automatic solution accuracy check.
- User controllable maximum central memory utilization and minimum cost variable central memory utilization.
- Input compatibility with all previous SAP versions.
- Greater convenience by allowing for real-time interactive solutions and simplified control card procedures.
- Automatic bandwidth resequencing, core memory dynamically allocated, and improved solution algorithms provide lower cost and greater efficiency.
- Interactive graphics for pre and post processing.
- Formatted RESULT File for use by user define program.

Company Name : **BOEING COMPUTER SERVICES COMPANY**

Headquarters Address : **177 Madison Avenue, Morristown, NJ 07960**

Product Name : **GTICES STRUDL**

Number of years commercially available : **2**

Date of last up-date or improvement : **1979**

Approximate number of current users : **70**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **John Corrie**

Telephone No.: **(206) 575-7066**

## General Description

GTICES STRUDL is an enhanced and completely revised version of the STRUDL structural analysis and design program. Developed and maintained by the Georgia Institute of Technology, this general purpose system represents a significant improvement in efficiency, reliability, and capability. The capabilities of GTICES STRUDL include:

- Solution with an English-like Problem-Oriented Language (POL).
- Static analysis and non linear analysis.
- A proprietary finite element dictionary containing over 31 elements for modelling plane stress/strain, axis geometrics, plots bending, three-dimensional, and shell problems.
- Dynamic analysis.
- 1969 and 1978 AISC steel design.
- TOWER design based on *ASCE Guide for Design of Steel Transmission Towers*.
- CRT graphics, pre and post-processing.
- Automatic generation of structural topology.
- Automatic computation of structural weight.
- Structural information processing achieved by modifying a structural data base.

The available facilities include a save/restore option.

## Special Features

GTICES STRUDL has been extensively modified. The special features include:

- Overall cost reduction of up to 60%.
- Over 500 bugs fixed in over 50 different areas of the program.
- Problem size independent within available computer resources.
- Direct computation of prismatic member matrices.
- Error checking with comprehensive diagnostics.
- Automatic band width reduction option.
- User control of output allowing a variety of formats.
- New features available on a continuing basis.
- BCS in-depth technical support.



Company Name : **BOEING COMPUTER SERVICES COMPANY**

Headquarters Address : **177 Madison Avenue, Morristown, NJ 07960**

Product Name : **MSC/NASTRAN\***

Number of years commercially available : **4**

Date of last up-date or improvement : **1979**

Approximate number of current users : **50**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **John Corrie**

Telephone No.: **(206) 575-7066**

### **General Description**

**NASTRAN is a general-purpose finite element program originally developed by the National Aeronautics and Space Administration (NASA).**

**A wide range of analysis capabilities has been built into NASTRAN, including static response to concentrated and distributed loads, to thermal expansion, and to enforced deformation; dynamic response to transient loads, to steady-state sinusoidal loads, and to random excitation; determination of real and complex eigenvalues for use in vibration analysis; and elastic stability analysis. NASTRAN has superior technical capabilities in areas of buckling, thermal and substructure ("super element") analysis. Many modelling conveniences are available such as multiple coordinate systems, rigid elements and multipoint constraint equations.**

**\*MSC/NASTRAN is an enhanced version of NASTRAN, licensed from the MacNeal-Schwendler Corporation.**

### **Special Features**

**SAIL II (Structural Analysis Input Language II) is a language for describing NASTRAN bulk data. Basic finiteelement input data are defined in an easy, straight-forward manner, using SAIL II statements. Users can take advantage of any pattern or sequence to minimize data input.**

**INSTAPLOT (Interactive Structural Analysis Plotting) provides the MSC/NASTRAN user with both interactive and offline graphics capability.**

**BCS provides experienced technical support in the use of NASTRAN/SAIL II/INSTAPLOT.**



Company Name : **BOEING COMPUTER SERVICES COMPANY**

Headquarters Address : **177 Madison Avenue, Morristown, NJ 07960**

Product Name : **PROJECT/2®\***

Number of years commercially available : **5**

Date of last up-date or improvement : **1977**

Approximate number of current users : **Several**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **John Corrie**

Telephone No.: **(206) 575-7066**

### **General Description**

**PROJECT/2** is a total software package for network based project scheduling and control. Through simple English-language commands, the project planner can easily adjust the network whenever conditions change. He can produce an instant picture of any new situation. Over 30 tabular and graphic reports can be produced to provide the specific information needed by each level of management within an organization or project.

**PROJECT/2** is a comprehensive scheduling tool which offers Network Plotting, CPM Scheduling, Progress Control, Cost Processing, Resource Allocation and Constraining and Multiproject features. **PROJECT/2** can process Activity-on-Arrow and Activity-on-Node networks using sophisticated scheduling algorithms.

\***PROJECT/2®** is a registered trademark of and licensed from Project Software and Development, Inc., Cambridge, Mass.

### **Special Features**





Company Name : **BOEING COMPUTER SERVICES COMPANY**

Headquarters Address : **177 Madison Avenue, Morristown, NJ 07960**

Product Name : **SYSTEM 2000\***

Number of years commercially available : **20**

Date of last up-date or improvement : **1978**

Approximate number of current users : **400**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **John Corrie**

Telephone No.: **(206) 575-7066**

### **General Description**

**SYSTEM 2000** is a general purpose data base management system that provides capabilities for rapidly developing complete information systems to fit a wide variety of applications.

With **SYSTEM 2000**, the user may define new data bases, modify definitions of existing data bases, and retrieve and update component values for existing data bases. The two means of interface between the user and a **SYSTEM 2000** data base are the natural language and the procedural language. The natural language, easily learned, provides the user with a self-contained language that does not require a knowledge of programming as a prerequisite for accessing a data base. The procedural language enables users to manipulate data in a **SYSTEM 2000** data base from a programming language such as **COBOL** or **FORTRAN**.

**BCS** maintains the latest level of **SYSTEM 2000** on **MAINSTREAM®-EKS**.

\***SYSTEM 2000** is licensed from **MRI Systems Corporation, Austin, Texas**.

### **Special Features**

Company Name : **BOEING COMPUTER SERVICES COMPANY**

Headquarters Address : **177 Madison Avenue, Morristown, NJ 07960**

Product Name : **TPIPE**

Number of years commercially available : **2**

Date of last up-date or improvement : **1979**

Approximate number of current users : **30**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **John Corrie**

Telephone No.: **(206) 575-7066**

## General Description

**TPIPE is a linear static and dynamic finite element program for pipe stress analysis developed by PMB Systems Engineering, Inc., San Francisco, CA.**

**TPIPE analysis capabilities include STATIC ANALYSIS of 1) Internal Pressure, 2) Gravity Loading, 3) Thermal Expansion Loads, 4) Concentrated External Forces and Moments, 5) Rigid Response Loads due to Earthquake Excitation, and 6) Support Displacements.**

**DYNAMIC ANALYSIS capabilities include 1) Frequency Extraction for determining piping system frequencies and mode shapes, 2) Response Spectrum Modal Superposition using frequency versus acceleration or period versus acceleration earthquake forces — TPIPE determines the piping system total response including displacements, nodal stresses, 3) Time History Modal Superposition using acceleration time histories of dynamic forces due to earthquakes or concentrated nodal loads, 4) Time Direct Integration Analysis using the equations of motion, coupled — used when high frequency content is present (i.e. Waterhammer, Impact). Additional TPIPE capabilities include 1) NRC Regulatory Guide 1.92 mode combination methods, 2) ASME Class 1 thermal transient analysis, 3) Stress classification according to ASME Boiler and Pressure Vessel Code, Section III, Class 1, 2 and 3 and ANSI B 31.1.**

## Special Features

**Unique user-oriented features of TPIPE include:**

- **Large problem capability — Features unlimited number of node points in piping system model; Eliminates the requirement to reduce model size by artificially dividing the piping system into subsystems.**
- **Plotting options for deformed and undeformed geometry — an important timesaver in the modeling phase of an analysis.**
- **Hanger support and pipe attachment evaluation.**
- **Analysis restart at all stages of analysis.**
- **Geometry generation routines for model control points, nodes, and members.**
- **Load group concept for simplified load case combinations.**
- **Cost competitive.**



Company Name : CALldata SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : ACAP

Number of years commercially available : 7

Date of last up-date or improvement : 1975

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : DEC-10

Headquarters contact : Peter Saltz

Telephone No.: (516) 575-5650

### General Description

The Advanced Circuit Analysis Program is a simple-to-use interactive program for analyzing the performance of linear electronic circuits. For every node in the circuit, ACAP can provide the following:

- Frequency response
- Steady state analysis
- Transient response
- Spectral analysis

### Special Features

ACAP has the following unique features:

- A Circuit Element Library — transistors, diodes, op-amps, etc.
- Pulse Source Model — Square wave, pulse, saw tooth, sine wave, etc.
- Built-In-Editor
- S and Z Parameter Black Boxes

Company Name : CALldata SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : ADLPIPE\*

Number of years commercially available : 5

Date of last up-date or improvement : 1978

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : CDC Cyber 172/73

Headquarters contact : Peter Saltz

Telephone No.: (516) 575-5650

## General Description

ADLPIPE is a program used for static and dynamic analysis of complex piping systems. All forces, moments, deflections, rotations and a summary stress report are included in the output. Orthographic, isometric, and stenographic plots are available as optional output.

The Thermal Transient Analysis module computes the transient temperature distribution across the pipe wall thickness as required by ASME II to compute the linear and non-linear thermal stresses.

The Time History Dynamic Analysis module computes the response of the piping system to known time dependent forcing functions (represented by sines-cosines, ploynomials, or a table of forces and time.)

\*ADLPIPE is a product of Arthur D. Little, Inc.

## Special Features

FREE is a utility which permits a user to Input data in free-format. This utility extends the power of ADLPIPE to the low-speed terminal user.

WHYWORK is a utility package which allows for interactive job set-up and initiation of a batch ADLPIPE run.

WHYWAIT is an interactive utility which allows the user to scan a special output file generated by ADLPIPE. The user can quickly evaluate the quality of the ADLPIPE run at an interactive terminal and either make changes to the input data for a new run, print the output locally or direct it to a high speed printer.



Company Name : CALldata SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : AMCAP

Number of years commercially available : 7

Date of last up-date or improvement : 1975

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : DEC-10

Headquarters contact : Peter Saltz

Telephone No.: (516) 575-5650

### General Description

AMCAP is a powerful interactive program specifically designed for use by microwave engineers. It can analyze any network from a simple wave-guide filter to a complex phased array antenna feed system, giving both data and plots on such characteristics as VSWR and Transmission loss. AMCAP allows a microwave engineer to examine all aspects of his design.

### Special Features

AMCAP presents the user with the following:

- Multiport analysis
- Easy-to-use english language commands
- Black box feature
- Smith chart outputs
- Built-in-editor

Company Name : CALldata SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : ANSYS\*

Number of years commercially available : 7

Date of last up-date or improvement : March, 1977

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : CDC Cyber 172/73

Headquarters contact : Peter Saltz

Telephone No.: (516) 575-5650

### General Description

ANSYS is a large-scale finite element program used for the solution of several classes of engineering problems. Its capabilities include structural analysis (static and dynamic, elastic, plastic, creep and swelling, small and large deflections) and heat transfer analysis (steady-state and transient, conduction, convection, radiation).

ANSRPP is a special utility which permits the user to define ANSYS data with free field formats. It may be used for batch or RJE input, but is particularly suited to low-speed interactive terminals.

ANSTEK is a reduced-core version of ANSYS which prepares geometrical plots of the structure under study. ANSTEK is generally employed with an interactive graphic terminal to display geometry plots prior to running ANSYS.

\*A product of Swanson Analysis Systems, Inc.

### Special Features

MASTER, a general interactive utility, assists users in generating control card files to execute a batch ANSYS run via a low-speed terminal device.

ANSYS special options include interactive pre- and post-processors, graphic output, X-Y plots of response and a complete data checking and error analysis facility.



Company Name : CALldata SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : CALLSEWR™

Number of years commercially available : 4

Date of last up-date or improvement : 1978

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : IBM 370

Headquarters contact : Peter Saltz

Telephone No.: (516) 575-5650

### General Description

CALLSEWR is a comprehensive set of programs used in the design and analysis of sewer systems. The major programs in the library include:

- SANSEWR — for sanitary sewer design and costing
- STRMSEWR — for design and analysis of stormwater collection systems
- INFILT — for evaluation and analysis of inflow and infiltration components of extraneous flow
- REVIEW — for analysis and evaluation of existing collection systems

### Special Features

The CALLSEWR system provides:

- input data editing capabilities
- project costing estimation
- graphic output capabilities



Company Name : **CALLDATA SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)**

Headquarters Address : **20 Crossways Park North, Woodbury, NY 11797**

Product Name : **COMPACT**

Number of years commercially available : **5**

Date of last up-date or improvement : **1977**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **DEC-10**

Headquarters contact : **Peter Saltz**

Telephone No.: **(516) 575-5650**

### **General Description**

**COMPACT**, which stands for **Computerized Optlmization of Microwave Passive and Active Circuits**, is an ideal, inexpensive engineering tool for circuit design in the high frequency and microwave region. The program has five main functions:

- **Circuit analysis and stability analysis**
- **Sensitivity analysis**
- **Optimization (up to 15 variables)**
- **Provide data for mapping**
- **Provide data for two-dimensional error-contours**

### **Special Features**

**COMPACT** offers two key advantages:

- **Simplicity**
- **Economy**

**COMPACT** is a versatile microwave program which can perform optimization analysis at the lowest price in the industry.



Company Name : CALDATA SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : ITRAC-II

Number of years commercially available : 7

Date of last up-date or improvement : 1975

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : DEC-10

Headquarters contact : Peter Saltz

Telephone No.: (516) 575-5650

### General Description

ITRAC-II is an augmented and improved version of the TRAC program designed for on-line, interactive, transient and DC analysis of electronic circuits. The program solves the linear and non-linear simultaneous equations characterizing the mathematical models used to predict circuit responses.

The program contains built-in standard models for resistors, voltage sources, current sources, capacitors, inductors, diodes, transistors (uses Ebers-Moll Semiconductor model) and transconductances. Non-standard models can be constructed from the standard models.

### Special Features

ITRAC-II has the following features:

- Easy-to-use interactive language.
- Cost efficient — Improved matrix reduction result in reduced computer time.
- On-line parameter modification capability.
- A large semiconductor library featuring all the Eber-Moll parameters.
- Graphic output capabilities.
- Capability to analyze radiation effects.



Company Name : CALDATA SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : MICROPROCESSOR SOFTWARE\*

Number of years commercially available : 3

Date of last up-date or improvement : 1979

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : DEC-10

Headquarters contact : Peter Saltz

Telephone No.: (516) 575-5650

### General Description

MICROPROCESSOR users have the convenience of writing assembly language programs for most MICROPROCESSORS, manufactured today, in a time-sharing environment rather than on either the hardware itself or on a development system. All of these cross-assemblers are written in assembly language and offer a significant cost savings over competing systems written in Fortran. The cross-assemblers presently available include:

- INTEL, NEC, TI and NATIONAL SEMICONDUCTOR 8080
- MOTOROLA, HITACHI, and AMI 6800
- 1802 PROCESSOR
- FAIRCHILD and MOSTEK F8
- MOS TECHNOLOGY MCS6500 SERIES
- ZILOG and MOSTEK Z-80
- TI TM 5100 and 9900 SERIES
- ROCKWELL PPS-8
- NATIONAL SEMICONDUCTOR PAGE

The following MICROPROCESSOR SIMULATORS are also available:

- INTEL 8080
- MOTOROLA 6800
- TI 1000

New cross-assemblers are added in response to customers needs.

\*Developed by Boston Systems Office, Inc.

### Special Features

In addition to the efficiency of our cross-assemblers, we offer the following enhancements:

- Full macro and conditional capabilities
- Input and output formats identical to those specified by the manufacturer
- An extensive listing of errors
- Normal arithmetic expression capability



Company Name : CALldata SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : MIFIL

Number of years commercially available : 6

Date of last up-date or improvement : 1974

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : DEC-10

Headquarters contact : Peter Saltz

Telephone No.: (516) 575-5650

### General Description

MIFIL is an interactive microwave filter design program. It designs three of the most commonly used bandpass microwave filters. It allows the engineer to design waveguide, combine and interdigital filters in a few minutes as opposed the many hours required by manual techniques.

### Special Features

MIFIL has the following advantages:

- Save Time and Money — Average filter design cost: \$10.00
- Convenient Output Format — Gives mechanical dimensions ready to enter on a machine drawing
- Calculates Other Mechanical Dimensions — Coupled rod, strip or bar structures

Company Name : **CALLDATA SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)**

Headquarters Address : **20 Crossways Park North, Woodbury, NY 11797**

Product Name : **NASTRAN\*PLUS**

Number of years commercially available : **8**

Date of last up-date or improvement : **1978**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **CDC Cyber 172/73**

Headquarters contact : **Peter Saltz**

Telephone No.: **(516) 575-5650**

## General Description

**NASTRAN\*PLUS** is an improved version of **NASA NASTRAN**. It is a general purpose program for the analysis of large scale static, dynamic and heat transfer problems for complex structures. The program uses the finite element method for solution of this class of problems.

## Special Features

**NASTRAN\*PLUS** has:

- Pre- and post-processors to increase flexibility of use.
- Extended graphics capability.



Company Name : CALldata SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : PREDICTOR

Number of years commercially available : 2

Date of last up-date or improvement : 1979

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : IBM 370

Headquarters contact : Peter Saltz

Telephone No.: (516) 575-5650

### General Description

PREDICTOR is a comprehensive product offering the reliability engineer a simple data base system and set of analysis programs to meet a demand for:

- Reliability studies
- Maintainability
- Parts listing
- Parts pricing

PREDICTOR offers the following built in functions:

- MIL-HDBK-217B specifications
- Duty cycle factors
- Parts cataloging
- Thermal profiling
- Failure Efforts Analysis (FMEA)
- In-house part number access
- User defined variable assumptions

### Special Features

In-house parts data base can be easily merged for use by PREDICTOR.



Company Name : CALldata SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : STRAIN

Number of years commercially available : 7

Date of last up-date or improvement : 1975

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : DEC-10

Headquarters contact : Peter Saltz

Telephone No.: (516) 575-5650

### General Description

STRAIN is a powerful tool for the analysis of framed structures, using the physical and loading characteristics of a structure as input to prepare a tabular summary of joint displacements and rotations, the moments, thrusts and shears affecting each member, and all external components.

### Special Features

STRAIN offers the following benefits:

- Saves Time To The Engineer — The results are provided in an easy-to-read concise manner.
- Analyze A Variety of Structures — Plane frame, Space frame, Plane grid, Space truss, Plane truss.
- Stiffness method relating member deformations and forces in terms of joint displacements.





Company Name : CALldata SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : STRUDL-II

Number of years commercially available : 10

Date of last up-date or improvement : 1978

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : IBM 370

Headquarters contact : Peter Saltz

Telephone No.: (516) 575-5650

### General Description

STRUDL-II, the STRUctural Design Language, is a computer system capable of assisting the engineer in structural design problems and decisions. STRUDL-II simplifies frame analysis for any structure. The procedures used are independent of the materials chosen as long as the properties of the materials are specified. Additionally, STRUDL-II provides a convenient method to store and retrieve information about the structures under study.

The analytic procedures available include the following:

- Determinate Analysis
- Preliminary Analysis
- Stiffness Analysis
- Non-linear Analysis
- Linear Buckling Analysis
- Dynamic Analysis

### Special Features

STRUDL-II contains the following features:

- Simplified command language
- Clear error and diagnostic messages
- Graphic output capabilities

Company Name : CALldata SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : SUPER\*SCEPTRE

Number of years commercially available : 5

Date of last up-date or improvement : 1975

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : IBM 370

Headquarters contact : Peter Saltz

Telephone No.: (516) 575-5650

## General Description

The development of SUPER\*SCEPTRE provides a versatile system of computer-aided-design and analysis. The program offers to the engineer those important techniques only available in the past to the electrical engineer.

About 1965, the ECAP program introduced to the electrical engineer the capacity to have the computer both write and solve the governing equations, requiring only a topological description of the electrical network. Later, SCEPTRE was able to automatically solve complex, non-linear problems.

SUPER\*SCEPTRE offers the mechanical engineer the opportunity to solve a class of problems by merely listing a topological description. There is no requirement to write, program or solve any equations. The program uses a field free format with a user-oriented language. Very few rules are necessary...no knowledge of FORTRAN or other computer experience is required.

SUPER\*SCEPTRE offers a systems analysis capability. A transfer function in the S-domain can be entered merely by specifying the co-efficients and/or roots of the numerator and denominator polynomials. SUPER\*SCEPTRE automatically generates a model of the transfer function which can then be connected to other models or components in a system.

SUPER\*SCEPTRE also offers a Digital Logic capability. Models of 16 different types of logic devices can be requested and will be automatically generated. The user has the option of specifying various parameters for the devices, such as propagation delay and switching threshold voltages. The model can be directly connected to continuous analog devices to simulate digital/analog systems.

## Special Features

- User-oriented
- Simulation of linear, non-linear and data systems with numerous blocks and feedback connections
- Interdisciplinary Solutions for:
  - electronic components
  - integrated circuits
  - transfer functions
  - digital logic blocks
  - mechanical components



Company Name : CALldata SYSTEMS, INC. (A subsidiary of Grumman Data Systems Corp.)

Headquarters Address : 20 Crossways Park North, Woodbury, NY 11797

Product Name : XCOGO\*

Number of years commercially available : 7

Date of last up-date or improvement : 1975

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : DEC-10

Headquarters contact : Peter Saltz

Telephone No.: (516) 575-5650

### General Description

XCOGO is an interactive and extended version of COGO developed at the Massachusetts Institute of Technology. It is a problem oriented computer language and programming system for solving geometric problems.

Typical XCOGO problems include:

- Highway and interchange design
- Bridge geometry
- Control and land surveys
- Construction Layout
- Right-of-way surveys
- Subdivision planning

XCOGO provides automated methods for adjusting measurement discrepancies and alignment problems.

\*XCOGO is a product of Computer Dynamics, Inc.

### Special Features

The main features of XCOGO are:

- Extended capabilities — 132 commands, extensive interactive capability, ability to save coordinate points from run to run, free field input, comprehensive error and diagnostic messages.
- Saves time to allow user to perform other work.



Company Name : **COMPUTER SCIENCES CORPORATION**  
Headquarters Address : **650 N. Sepulveda Blvd., El Segundo, CA 90245**

Product Name : **AAA PROGRAMS**  
Number of years commercially available : **3 at CSC**  
Date of last up-date or improvement : **June 1977**  
Approximate number of current users : **n.a.**  
Purchase price if available on in-house equipment : **n.a.**  
Type(s) of equipment compatible for in-house use : **n.a.**  
Headquarters contact : **Sarv Singh** Telephone No.: **(213) 678-0311**

### **General Description**

The AAA PROGRAMS allow an engineer to address problems related to piping systems in the petro-chemical, pipeline, power, ship-building industries. Some of the capabilities are:

- Piping flexibility analysis with wide selection of options for static analysis including thermal effects, weight, pressure, wind loading, and displacement and flexibility of anchors.
- ANSI, NEMA, API, ROT code compliance.
- Complete design of pressure vessels in accordance with Section VIII Div. 1 of the ASME Boiler and Pressure Vessel Codes.
- Determination of local stresses in spherical and cylindrical shells due to external loading according to the "Welding Research Council" Bulletin No. 107.

### **Special Features**

- Stress intensification factors internally calculated from entered properties.
- Pressure vessels analyzed, designed on related using Zick analysis method as an option.
- Data base of standard materials, used in pressure vessel design, automatically attached.
- Spring hanger design.



Company Name : COMPUTER SCIENCES CORPORATION

Headquarters Address : 650 N. Sepulveda Blvd., El Segundo, CA 90245

Product Name : ANSYS

Number of years commercially available : 5 at CSC

Date of last up-date or improvement : August 1977

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Sarv Singh

Telephone No.: (213) 678-0311

### General Description

ANSYS is a general-purpose computer program designed to solve a wide variety of problems in the field of engineering analysis. It was structured to perform more efficiently than most special-purpose programs and it features the following capabilities:

- Structural analyses including static elastic, plastic and creep, dynamic, seismic and dynamic plastic, and large deflection and stability analyses.
- Fluid flow analyses.
- Transient heat transfer analyses including conduction, convection, and radiation with direct input thermal-stress analyses.

### Special Features

- Interactive graphics and free format input.
- "Wavefront" technique resulting in efficient solution speeds.
- Restart capability allowing several analyses to be set up sequentially.
- The most comprehensive library of finite elements including gaps, friction, interfaces, and isoparametric solids.



Company Name : COMPUTER SCIENCES CORPORATION  
Headquarters Address : 650 N. Sepulveda Blvd., El Segundo, CA 90245

Product Name : CSC-TRAC  
Number of years commercially available : 6 at CSC  
Date of last up-date or improvement : August 1, 1977  
Approximate number of current users : n.a.  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Zaf Sutarwala  
Telephone No.: (213) 678-0311

### General Description

CSC-TRAC provides the engineer an efficient tool for automatic analysis and computations of the AC, DC, and transient responses of nonlinear electronic circuits. Some of the important features are listed below.

- Built-in device models for diodes, transistors, MOSFETS and JFETS.
- A parameter library of 96 diodes and transistors.
- Ability to build and incorporate user's models and subcircuits.
- Ability to utilize user-generated Fortran statements, functions and subroutines.
- Control over pre- and post-convergence computations.

### Special Features

- Double precision arithmetic to ensure high degree of computational accuracy.
- On-line graphics plotting.
- Automatic generation of network equations.
- Input is user-oriented and in free form.



Company Name : COMPUTER SCIENCES CORPORATION  
Headquarters Address : 650 N. Sepulveda Blvd., El Segundo, CA 90245

Product Name : GASP  
Number of years commercially available : 5 at CSC  
Date of last up-date or improvement : August 1, 1977  
Approximate number of current users : n.a.  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Sarv Singh  
Telephone No.: (213) 678-0311

### General Description

GASP is designed to solve structural engineering problems frequently encountered in the construction industry. The program uses the stiffness method of analysis which requires the structure to be idealized into discrete elements, such as beams, columns, plates, etc. It features:

- Static analysis of space frame structures.
- Thermal analysis of space frame structures.
- Dynamic analysis is accomplished by processing the stiffeners matrix through a related program called FREVIB.
- Dynamic analysis of submerged structures such as offshore platforms.
- Seismic and machinery loads analysis.

### Special Features

- Interactive graphics to check and alter input data.
- Elaborate facility for post-processing including deflected shape, fundamental modes of vibration of the structure.
- Restart capability allows for economical processing of several loading conditions.





Company Name : **COMPUTER SCIENCES CORPORATION**  
Headquarters Address : **650 N. Sepulveda Blvd., El Segundo, CA 90245**

Product Name : **MISTER**  
Number of years commercially available : **5 at CSC**  
Date of last up-date or improvement : **May 1978**  
Approximate number of current users : **n.a.**  
Purchase price if available on in-house equipment : **Available only on CSC network**  
Type(s) of equipment compatible for in-house use : **n.a.**  
Headquarters contact : **Phil Becker**

Telephone No.: **(213) 678-0311**

### **General Description**

**MISTER, a Management Information System for Time, Expenses, and Resources, is a system of computer programs that provides management with complete visibility of time, expenses, and resources to assist in project planning and control. MISTER may be run on-line or in batch mode and is used to identify potential problems and bottlenecks and to give management the opportunity to anticipate changes in plans. It assures that the adopted plan is workable and proposes contingency plans if unexpected problems develop.**

**During the execution of a project, the program allows for continuous monitoring of the progress and updating of the situation. The effect of delays, accelerations, and unexpected events upon the schedule is immediately determined so that the management is able to study and select the best alternative action.**

### **Special Features**

**MISTER has been designed to take full advantage of interactive processing. MISTER is modularized so that the user can select the appropriate analysis functions that result in the most effective control for a given project. The modules include:**

- A. Critical Path Scheduling - performs the analysis on network of up to 40,000 activities, calculates anticipated project costs, and outputs the results with a variety of reports.**
- B. Updating - Updates the network to reflect changes in activities, and generates a variety of status reports.**
- C. Resource Scheduling - allows the user to define various resource pools which can be made available to one or more projects.**
- D. Display Modules - special reports modules are also available for bar charts, graphic plots and project schedules.**



Company Name : **COMPUTER SCIENCES CORPORATION**

Headquarters Address : **650 N. Sepuveda Blvd., El Segundo, CA 90245**

Product Name : **NASTRAN**

Number of years commercially available : **4 at CSC**

Date of last up-date or improvement : **August 1, 1977**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Sarv Singh** Telephone No.: **(213) 678-0311**

### **General Description**

**NASTRAN is a general-purpose digital computer program for the analysis of large complex structures. It features:**

- **Static analysis of general three-dimensional structures.**
- **Static analysis with Inertia Relief.**
- **Normal modes analysis.**
- **Static analysis with Differential Stiffeners.**
- **Buckling analysis.**
- **Piecewise linear analysis.**
- **Frequency and Random Response analysis.**
- **Transient dynamic analysis.**
- **Complex eigenvalue extraction.**

### **Special Features**

- **Cyclic symmetry for statics and real eigenvalue analysis.**
- **Acoustic cavity analysis for vibration.**
- **Hydroelastic analysis for dynamics and eigen-solutions.**
- **Aeroelastic analysis for complex eigen-solutions.**
- **Restart and substructuring available.**
- **User supplied Fortran can be incorporated.**



Company Name : COMPUTER SCIENCES CORPORATION

Headquarters Address : 650 N. Sepulveda Blvd., El Segundo, CA 90245

Product Name : SDRC PROGRAMS

Number of years commercially available : 3 at CSC

Date of last up-date or improvement : August 1978

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Sarv Singh

Telephone No.: (213) 678-0311

### General Description

The SDRC PROGRAMS consists of a comprehensive library of computer programs to aid design engineers with the full spectrum of static and dynamic machinery performance analysis. It features:

- Calculation of beam properties, including location of centroid, principal axis, area moments of inertia, weight, warping and torsional constants of arbitrary cross-sections.
- Static and dynamic analysis of space frame structures including effects due to tapered and curved beams, shear deformation, and beam columns.
- Static and dynamic analysis of rotating shafts and single branched geared shaft systems.
- General-purpose isoparametric finite program for static and heat transfer analyses.

### Special Features

- User-oriented with free format input and graphics attached to each program.
- Reduction techniques for economical processing of large models.
- Restart capability allowing several analyses to be set up sequentially.



Company Name : **COMPUTER SCIENCES CORPORATION**

Headquarters Address : **650 N. Sepulveda Blvd., El Segundo, CA 90245**

Product Name : **SPRED**

Number of years commercially available : **3 at CSC**

Date of last up-date or improvement : **August 1978**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **Available only on CSC network**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Phil Becker** Telephone No.: **(213) 678-0311**

### General Description

The SPRED project management system provides the project planner with a tool that simplifies his task. Using the SPREDX and SPREDP on-line subsystems, he can remove much of the tedium from and effect cost savings in his planning activity. The primary goal of SPRED when used with CSC's on-line network is to give the user access to a very easy to use system so he can readily produce complete, working PMS Networks. An on-line user can direct the computer programs to:

- Perform the calculations required to assign start and finish schedule dates to work activities.
- Create the work schedules.
- Create reports that simplify his monitoring responsibilities.
- Update his activity network.
- Create other management reports that aid in decision making.
- Modify his network to reflect the results of his replanning efforts.
- Create project evaluation reports.
- Create presentation-quality, network diagrams.

SPRED is a proprietary package development by Tetrad Computer Applications Ltd.

### Special Features

SPRED incorporates a variety of powerful features that result in a flexible yet easy-to-use system. Networks may be defined as arrow or procedure diagrams. Up to 2000 activities may be designated with the duration in days, weeks, months or fractions thereof. There is unlimited resource specification and either lagging or overlapping phasing of activities is allowed. Project updating is semi-automatic.

SPRED produces a complete selection of reports including master schedules that can be sorted on start, finish duration or float among other fields. Subreports can be selected based on activity subcodes. Progress reports showing updated status, reports that compare current with previous status, resource loading reports and cash flow studies are also available.



Company Name : MCDONNELL DOUGLAS AUTOMATION COMPANY (MCAUTO)

Headquarters Address : P.O. Box 516, St. Louis, MO 63166

Product Name : ENGINEERING SERVICES

Number of years commercially available : 12

Date of last up-date or improvement : Continually being enhanced

Approximate number of current users : 1000

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : J. W. Flanders

Telephone No.: (314) 232-7876

### General Description

MCAUTO's Engineering Services Programs encompass all major Engineering disciplines including:

**MECHANICAL** — Energy Analysis, Simulation, Piping, Pressure Vessels, Heat Transfer Analysis.

**CIVIL** — Transportation, Mapping, Mining, Fluid Flow, Geotechnical, Coordinate Geometry, Highway Design.

**NUCLEAR** — Shielding, Safety, Fuel Management.

**ELECTRICAL** — Electronics, Networks, Fault Analysis, Loadflow Analysis.

**STRUCTURAL** — Design, Drafting, Concrete, Steel; Analysis, Statics, Dynamics; Heat Transfer; Special, Offshore, Tower.

**PROJECT MANAGEMENT** — Resource Allocation, Risk Analysis, Cost Management, Cost Accounting, CPM Scheduling.

### Special Features

Although most of the programs in the Engineering Services library are executed in a batch mode (on either the IBM or CDC Hardware), the majority of them have interactive interfaces that facilitate data input and data validation. Output from the programs may be reviewed interactively before routing to a high speed output device connected to either the IBM or CDC batch systems.

Many of the Structural Engineering programs are interfaced with MCAUTO's interactive graphics package, FASTDRAW. FASTDRAW features two and three dimensional model building and display, interactive mesh generation, user defined elements, element duplication, local coordinate systems, and routine geometry construction.

MCAUTO's Engineering Services are fully supported by a consulting staff of more than 100 people including 26 Registered Professional Engineers and 12 Ph.D.'s.



Company Name : NATIONAL CSS, INC.  
Headquarters Address : 187 Danbury Rd., Wilton, CT 06897

Product Name : ACCOS V  
Number of years commercially available : 8  
Date of last up-date or improvement : July 1978  
Approximate number of current users : n.a.  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Nat Rosenberg

Telephone No.: (203) 762-2511

### General Description

ACCOS V is a set of interactive programs which are used for lens design and image evaluation. Among the functions which can be performed using ACCOS V are automatic optimization with modified orthonormalization algorithm; image evaluation by spot diagrams and radial energy distributions and knife edge; ray trace, third and fifth order aberrations.

### Special Features



Company Name : NATIONAL CSS, INC.  
Headquarters Address : 187 Danbury Rd., Wilton, CT 06897

Product Name : AGS  
Number of years commercially available : 5  
Date of last up-date or improvement : 1974  
Approximate number of current users : o.a.  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Nat Rosenberg  
Telephone No.: (203) 762-2511

### General Description

The programs in the AGS library cover all of the common soils computations:

- slope stability analysis by both Bishop's and Morgenstern's methods;
- stress and strain distributions by finite elements with graphical output;
- flow nets and fluid flow, also by finite elements with graphical output;
- settlement analysis for complex and time-varying loadings;
- computation and plotting of consolidation and triaxial tests;  
reduction and plotting (along with storage and selective retrieval) of field measurements from piezometers, settlement rods, inclinometers, and virtually any other field instrument.

AGS is licensed to NCSS by Applied Geodata Systems Cambridge, Mass.

### Special Features





Company Name : NATIONAL CSS, INC.  
Headquarters Address : 187 Danbury Rd., Wilton, CT 06897

Product Name : AMPSYN  
Number of years commercially available : 3  
Date of last up-date or improvement : May, 1979  
Approximate number of current users : 50  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Nathan Rosenberg  
Telephone No.: (203) 762-2511

### General Description

AMPSYN is a direct synthesis computer-aided program used to design high frequency and/or microwave matching networks including amplifier input, output, and interstage circuits.

AMPSYN synthesizes lossless lumped element matching networks and provides for transformation of the lumped design to approximate transmission line equivalents.

From the requested information, AMPSYN will report the values of the components necessary to meet your design specs. These component values can be used as a starting point for further synthesis, simulation or analysis.

Version 1.2 introduced odd-element networks, exact parasitic absorption mode and the ability of generating tables of the acceptable network topologies.

### Special Features

- Conversational Mode
- Network Synthesis
- Topological Inspection
- Impedance/Frequency Scaling
- Parasitic Absorption
- Frequency Analysis
- Transmission Line Conversion
- Even or odd order networks

Company Name : **NATIONAL CSS, INC.**

Headquarters Address : **187 Danbury Rd., Wilton, CT 06897**

Product Name : **CADSYN™**

Number of years commercially available : **New**

Date of last up-date or improvement : **June, 1979**

Approximate number of current users :

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact : **Nathan Rosenberg** Telephone No.: **(203) 762-2511**

## General Description

CADSYN is a distributed matching network synthesis computer routine. Bandwidth, gain slope, transmission line length insertion loss, ripple, and circuit topology are all selectable and can be modified as desired. Theoretical gain bandwidth limitations can be calculated to predict device performance prior to synthesis. Interactive use of Kuroda's identity, Norton transformation, duality, and impedance scaling provides the capability to design matching networks with arbitrary impedance transformation and realizable element values. All synthesis and transformation steps are transparent to the user, so those inexperienced in modern synthesis techniques can easily learn to design matching networks with the program.

## Special Features

- Beginner's or Expert modes
- Series and Parallel Stubs, Unit Elements
- Arbitrary Gain Slope and Ripple



Company Name : NATIONAL CSS, INC.  
Headquarters Address : 187 Danbury Rd., Wilton, CT 06897

Product Name : COMPACT  
Number of years commercially available : 7  
Date of last up-date or improvement : June, 1979  
Approximate number of current users : 400  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Nathan Rosenberg Telephone No.: (203) 762-2511

### General Description

COMPACT (Computer Optimization of Microwave Passive and Active Circuits) is a computer-aided tool created specifically for use by high frequency and microwave design engineers. It combines the most sophisticated frequency analysis and optimization capabilities available today and yet is quite easy to use.

COMPACT reports results in concise table formats and also provides plotting of linear charts and SMITH CHARTS. All designed to save time and effort.

### Special Features

- Circuit Analysis
- Sensitivity Analysis
- Monte Carlo Worst Case
- Transistor Library
- Group delay computation
- Dependent variables
- Nodal and port analysis
- Stability Analysis
- Optimization
- Engineering Language
- Microstrip and Strip Transmission lines
- Lange-Coupler design
- Noise Figure Computation
- Exact coupled line computation

Company Name : **NATIONAL CSS, INC.**

Headquarters Address : **187 Danbury Rd., Wilton, CT 06897**

Product Name : **DEELAY™**

Number of years commercially available : **new**

Date of last up-date or improvement : **June, 1979**

Approximate number of current users :

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact : **Nathan Rosenberg** Telephone No.: **(203) 762-2511**

## General Description

An interactive circuit design computer program, DEELAY, provides group delay equalizer networks to compensate the delay distortion of filters. The equalizers are all-pass sections that do not affect the magnitude of the frequency response. The program accepts either the actual delay response or the natural modes (zeros of the denominator of the transfer function) of the network to be equalized. A "least squares" approximation calculates the sum of the delay to be equalized and the delay of the equalizers, the deviation from an appropriate constant, and finally, adds the squares of deviations to form a single measure of error. In the approximation stage, the program then attempts to modify the parameters of the delay sections to reduce this "RMS" error to its minimum.

## Special Features



Company Name : **NATIONAL CSS, INC.**

Headquarters Address : **187 Danbury Rd., Wilton, CT 06897**

Product Name : **FILSYN**

Number of years commercially available : **3**

Date of last up-date or improvement : **March, 1979**

Approximate number of current users : **50**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Nathan Rosenberg** Telephone No.: **(203) 762-2511**

### General Description

FILSYN is a general purpose, FILter SYNthesis program for the design of all types of passive, active, and digital filters. The conversational interactive operation enables the user to design the ultimate in filter structures and does not require previous theoretical knowledge or the use of filter tables. The type of filter designs available with the FILSYN program include lowpass, linear-phase lowpass, highpass, and bandpass. All of these can be designed with various options including maximally flat or equal ripple-type passband; monotonic, equal minima, or arbitrary stopband; or arbitrary terminations. For more general cases, functional input is also available.

### Special Features

- Passive, active and digital filters up to degree 50
- Butterworth, Chebysev, Bessel and Elliptic types
- Standard, matched or bilinear Z-transformed digital filters
- Leapfrog type active RC realization
- Finite or extreme terminations
- Conversational or batch input mode to satisfy both the novice and expert
- Pole Placer subprogram
- Automatic impedance transformation
- Analysis from transfer function or circuit



Company Name : NATIONAL CSS, INC.  
Headquarters Address : 187 Danbury Rd., Wilton, CT 06897

Product Name : ISPICE  
Number of years commercially available : 6  
Date of last up-date or improvement : June, 1979  
Approximate number of current users :  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Nathan Rosenberg  
Telephone No.: (203) 762-2511

### General Description

ISPICE is a fully interactive non-linear electronic circuit simulation program that performs DC, AC, TRANSIENT, TEMPERATURE, and PARAMETRIC simulations all from the same single circuit description. It contains passive elements and built-in models including DIODES, JFETS, MOSFETS, OPAMPS, and INTEGRATED BIPOLAR Transistors, as well as a Transistor and Opamp library. It has virtually no circuit size or complexity constraints and is also available in batch. ISPICE contains save and restore options and allows users to create their own model libraries and sub-network structures.

### Special Features

- Graphical, Tabular Output
- Free Format Input
- Engineering Language
- Noise Analysis
- Fourier Analysis
- Fault Analysis
- Sensitivity Analysis (DC, AC)
- Worst Case Analysis (DC, AC)
- Monte Carlo Analysis (DC, AC)
- Autotimestep

Date: September, 1979

Submitted By: Nathan Rosenberg, Manager - Engineering Systems



Company Name : NATIONAL CSS, INC.  
Headquarters Address : 187 Danbury Rd., Wilton, CT 06897

Product Name : LOGCAP  
Number of years commercially available : 9  
Date of last up-date or improvement : March, 1979  
Approximate number of current users :  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : John Pantone Telephone No.: (203) 762-2511

### General Description

LOGCAP is a practical and easy to use tool for the designer of digital circuits. It is a comprehensive system containing everything needed to efficiently simulate logic networks, perform analysis, and verify design validity.

LOGCAP's wide range of design aid capabilities is based on advanced software techniques employing macromodels for complex logic functions.

### Special Features

- Simple English Language Format
- Extensive Model Libraries TTL, CMOS, User supplied
- Detects Races, Hazards, and Toggles
- Simulates and Analyzes Faults
- Obtains Fault Signatures
- Analyzes Fanin/Fanout Loadings
- Produces Programs for Digital Logic Testers





Company Name : NATIONAL CSS, INC.

Headquarters Address : 187 Danbury Rd., Wilton, CT 06897

Product Name : MICROPROCESSOR SUPPORT SOFTWARE

Number of years commercially available : 4

Date of last up-date or improvement : May, 1979

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : John Pantone

Telephone No.: (203) 762-2511

### General Description

To help realize the true potential of microprocessors, NCSS offers program development and diagnostic software tools to speed the development of and eliminate errors in program designs.

These tools, include high-level language COMPILERS, CROSS-ASSEMBLERS, SIMULATORS, LOADERS, and UTILITY programs.

Support software is available for the following:

- AMI6800
- FAIRCHILD F-8
- INTEL 8008, 8080, 4004, 4040, 8048, 8085
- TEXAS INSTRUMENTS TI1000, TI9900
- ZILOG Z-80
- MM6700
- IM6100
- MOS/ROCKWELL 6500
- NATIONAL PACE: IMP-16, SC/MP
- RAY2901
- RCA CDP1802
- ROCKWELL PPS-4, PPS-4/1, PPS-8
- SMS MICROCONTROLLER
- SIGNETICS 2650, 8X300

### Special Features

High level languages available for:

- 6800 - Intermetrics plm6800
- 2650 - Signetics plus
- 8080 - Zilog PL/M
- Z-80 - Zilog PL/M
- BIT SLICES - Zeno Systems DAPL



Company Name : NATIONAL CSS, INC.

Headquarters Address : 187 Danbury Rd., Wilton, CT 06897

Product Name : PROPHECY

Number of years commercially available : 3

Date of last up-date or improvement : February 1978

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Nathan Rosenberg

Telephone No.: (203) 762-2511

### General Description

PROPHECY is an interactive program that performs failure-rate prediction according to the methodology prescribed by MIL-HDBK-217B.

PROPHECY performs automatic calculation and contains a large data-base of MIL-SPEC parts. From a user's parts list and application conditions, Prophecy, in minutes, reports the failure-rate and MTBF for electronic modules or assemblies. All intermediate "Pi" factors and base failure rates are calculated automatically and available for inspection.

### Special Features

- Automatic Procedure
- MIL-HDBK-217B Methods
- MIL-SPEC Library
- Trade-Off Analysis
- Selective Output
- Interactive



Company Name : NATIONAL CSS, INC.  
Headquarters Address : 187 Danbury Rd., Wilton, CT 06897

Product Name : STRU-PAK  
Number of years commercially available : 7  
Date of last up-date or improvement : July 1978  
Approximate number of current users : n.a.  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Nathan Rosenberg

Telephone No.: (203) 762-2511

### General Description

STRU-PAK is a collection of 31 separate programs which are used to solve a wide variety of structural analysis/design problems commonly occurring in structural mechanics. Programs address areas including: section properties, beam and column problems, frame/truss structural analysis and modal/dynamic response analysis.

STRU-PAK is licensed to NCSS by TRW Systems Group, Redondo Beach, CA.

### Special Features



Company Name : STONER ASSOCIATES, INC.

Headquarters Address : P.O. Box 86, Carlisle, PA 17013

Product Name : GASSS®

Number of years commercially available : 8

Date of last up-date or improvement : May, 1979

Approximate number of current users : 50

Purchase price if available on in-house equipment : Available on NCSS Time-Sharing Service

Type(s) of equipment compatible for in-house use : Not Applicable

Headquarters contact : David E. Goldberg, Marketing Manager

Telephone No.: (717) 243-9212

### General Description

The GASSS® (GAS Steady State) Analysis Procedure simulates the pressure-flow relationship for systems composed of pipelines, compressors, valves and storage fields. GASSS is useful for performing design and analysis studies of natural gas transmission and distribution systems, municipal and industrial steam systems, air systems, etc. User input data is minimized and the user is not required to perform indexing of the network, since its operation is done internally by the program. A recent enhancement is a schematic-producing routine that provides graphic output of solution results in user-defined dimensions. A sensitivity analysis can also be performed on a balanced system. The small version program (256K machine) can be used on problems up to 400 facilities and 350 nodes. A large version is available which can be used for problems up to 10,000 facilities and 7,500 nodes.

### Special Features

The GASSS procedure enables the user to model a complete or integrated system with compressors and regulators anywhere in the system. Both high-pressure gas systems and low-pressure (inches of water column) distribution systems can be modeled. The GASSS analysis provides the ability to solve dry, saturated steam flow models. A fundamental steam flow equation has been developed that is intended, primarily, for district heating system analysis, although it may be useful in other steam applications. The GASSS service provides a BTU balancing capability, which allows the user to balance gas networks based on therm rate loading, which is useful in systems supplied by pipeline gas and a mixture of propane air, vaporized LNG, or a synthetic natural gas. GASSS uses a free format data input structure and is designed for interactive time-sharing use.

Company Name : **STONER ASSOCIATES, INC.**

Headquarters Address : **P.O. Box 86, Carlisle, PA 17013**

Product Name : **GASUS®**

Number of years commercially available : **5**

Date of last up-date or improvement : **April, 1979**

Approximate number of current users : **20**

Purchase price if available on in-house equipment : **Available on NCSS Time-Sharing Service**

Type(s) of equipment compatible for in-house use : **Not Applicable**

Headquarters contact : **David E. Goldberg, Marketing Manager**

Telephone No.: **(717) 243-9212**

## General Description

The GASUS® (GAS Unsteady State) analysis is a general purpose simulator, which models unsteady flow in natural gas transportation systems. Systems containing pipelines, compressors, valves, regulators, and storage fields can be simulated.

A new enhancement permits the dynamic effects of controllers to be modeled. GASUS now simulates the action of proportional-integral-derivative or pure integral controllers operating from a user-defined signal to control valve operation or compressor speed.

Studies such as time of system failure, response of the system to compressor failures, line-pack swings, etc., can be investigated with this model. GASUS is flexible enough to model any speed transients in any sized networks. Very fast transients, such as those found in flaring problems or the instantaneous shutdown of control equipment can be easily modeled. The analysis can be used to determine the amount of gas lost if a linebreak occurs.

## Special Features

Either English or Metric units can be used, and user can select his own particular dimensions for such items as flowrates, time, length, and diameters, etc. Pipeline dynamic equations are solved, using the method of characteristics procedure Incorporating an inertia multiplier concept. GASUS analysis provides plotting displays of variables versus time transmitted directly to the user's terminal, line printer, or graphics device. A recent enhancement provides high resolution plotting in report ready form. The simulation uses a free format data input structure and is designed for interactive time-sharing use.



Company Name : STONER ASSOCIATES, INC.

Headquarters Address : P.O. Box 86, Carlisle, PA 17013

Product Name : LIQSS®

Number of years commercially available : 7

Date of last up-date or improvement : August, 1977

Approximate number of current users : 35

Purchase price if available on in-house equipment : Available on NCSS Time-Sharing Service

Type(s) of equipment compatible for in-house use : Not Applicable

Headquarters contact : David E. Goldberg, Marketing Manager

Telephone No.: (717) 243-9212

### General Description

LIQSS® (LIQuid Steady State) analysis procedure determines the balanced steady state head-flow relationship for a liquid network system composed of pipelines, pumps, and valves. It is useful in the design and operation of water distribution systems, petroleum product pipelines, processed piping systems, fire sprinkler systems, etc. The present version can solve problems of up to 3,000 nodes. The simulation performs a sensitivity analysis on the balanced model. In the solution, there are N unknowns (pressures, node flows, etc.) for N-node systems. All the variables are given fixed values. The sensitivity analysis provides approximate answers to how much the unknowns would change for a given change in one of the fixed parameters.

### Special Features

A recent enhancement is a schematic-producing routine which provides plotted output of solution results in User-defined dimensions. Flow units and pipeline length units are selected by the user. Pumps and valves can be placed anywhere within the network, enabling the user to model his system in an integrated manner. The user is not required to perform indexing which is done internally by the simulation procedure. The LIQSS analysis offers free format data input structure and is designed for interactive time-sharing use.



Company Name : **STONER ASSOCIATES, INC.**

Headquarters Address : **P.O. Box 86, Carlisle, PA 17013**

Product Name : **LIQT®**

Number of years commercially available : **4**

Date of last up-date or improvement : **May, 1979**

Approximate number of current users : **20**

Purchase price if available on in-house equipment : **Available on NCSS Time-sharing Service**

Type(s) of equipment compatible for in-house use : **Not Applicable**

Headquarters contact : **David E. Goldberg, Marketing Manager**

Telephone No.: **(717) 243-9212**

### **General Description**

The LIQT® (LIQuid Transient) analysis procedure is a general purpose liquid transient simulator that analyzes the time varying response of a closed conduit system. It can be used to model hydraulic transients in liquid transportation systems, composed of pipelines, pumps, valves, reservoirs, and various surge protection devices. A new capability will allow the dynamic effects of controllers to be modeled. LIQT now simulates the action of proportional-integral-derivative or pure integral controllers operating from a user-defined signal to control valve operation or pump speed.

Pressure transients in water distribution systems, cooling water systems for power stations, processed piping systems, and oil pipelines can be modeled with a minimum of data preparation by the user. LIQT simulation is useful for analyzing pump failures or startups, valve operations, changing head or flow conditions, and other types of transient inducing operations. The effect of surge control devices, such as surge tanks, relief valves, accumulators and vacuum breakers can be determined.

### **Special Features**

Either English or SI units can be used. In the English system, a variety of flow-rate units such as CSS, GPM, etc., are utilized. The LIQT analysis provides plotting displays or variables versus time directly to the user's terminal or line printer. The simulation uses a free format data input structure and is designed for interactive time-sharing use.





Company Name : UNIVERSITY COMPUTING COMPANY

Headquarters Address : 1930 Hi Line Drive, Dallas, TX 75207

Product Name : ARCHITECTURAL & HEAT TRANSFER LIBRARY

Number of years commercially available : 9

Date of last up-date or improvement : January, 1977

Approximate number of current users :

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact : Product Manager

Telephone No.: (214) 655-8894

### General Description

#### ARCHITECTURAL ENGINEERING

Building Energy Systems, Ross Merriwether

EEC (Equipment Energy Consumption/B) @ •

ERCK (Energy Requirements Input Data Check) @ •

ERE (Energy Requirements Estimate) @ •

TCR (Total Coincident Requirement) @ •

1100-ICES (Cibii Engineering) •

LUMEN-2 @\*

MEDSI @

#### HEAT TRANSFER

AC-2 (Air Cooled Exchangers) \*@

AIDEX @

FRNC-5 (Fired Boilers) @\*

HTRI (Heat Transfer Research Institute) @\*

SINDA @ •

### Special Features

The UCC Architectural and Heat Transfer Libraries are available on one or more of the CDC, IBM, or UNIVAC Systems as indicated by the following keys:

@ - UCC 1108 EXEC

\* - CDC NOS/BE

• - UNIVAC 1100/OS

# - IBM/370 MVS



Company Name : UNIVERSITY COMPUTING COMPANY

Headquarters Address : 1930 HI Line Drive, Dallas, TX 75207

Product Name : ELECTRIC POWER INDUSTRY LIBRARY

Number of years commercially available :

Date of last up-date or improvement : January, 1977

Approximate number of current users :

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact : Product Manager

Telephone No.: (214) 655-8894

### General Description

#### ELECTRIC POWER INDUSTRY

##### THERMAL HYDRAULICS

BEACON \*  
COBRA \*  
CONCEN \*  
CONTEMPTLT26 \*  
CONTEMPT4 \*  
FRAP \*  
GAPCON \*  
HEATING5 \*  
LION \*  
MOXY \*  
RELAP SERIES \*  
RETRAN 1\*  
SHAKE2 \*  
TOODEE2\*  
WHAM6 \*

##### FUEL MANAGEMENT

ARMP 1\*  
CASMO \*  
CITATION \*  
FMS (SCANDPOWER) \*

##### FUEL PERFORMANCE

COBRA \*  
COMETH 1\*  
FRAP \*  
GAPCON \*  
LION \*  
RELAP SERIES \*  
SHIELDING AND CRITICALITY  
AMPX \*  
ANISN \*  
DOMINO \*  
DOT \*  
DENO \*  
MORSE \*  
QAD \*  
SWAN LAKE \*

PDQ7 \*  
SHUFFLE (EI) \*  
SIMULATE 1\*

### Special Features

1 - EPRI member utilities

The UCC Electric Power Industry Library is available on one or more of the CDC, IBM or UNIVAC systems as indicated by the following keys:

@ - UCC 1108 EXEC  
\* - CDC NOS/BE  
• - UNIVAC 1100/OS  
# - IBM/370 MVS



Company Name : UNIVERSITY COMPUTING COMPANY

Headquarters Address : 1930 Hi Line Drive, Dallas, TX 75207

Product Name : ELECTRONICS LIBRARY

Number of years commercially available : 9

Date of last up-date or improvement : January, 1977

Approximate number of current users :

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact : Product Manager

Telephone No.: (214) 655-8894

### General Description

D-LASAR (Digitest Logica Stimulus & Response) @

MAGIC (Modern Analyt. Gen. of Improved Circuits) @

MICROPROCESSOR (Assembler & Simulator) #

RM PREDICTOR (Reliability Analysis) @

SCEPTRE II (Nonlinear Circuit Analysis) @

SPICE (Transient and AC Analysis) @\*

UCCAP & MONOCHIP (UCC Analysis Program) @\*

### Special Features

The UCC Electronics Library is available on one or more of the CDC, IBM, or UNIVAC Systems as indicated by the following keys:

- @ - UCC 1108 EXEC
- \* - CDC NOS/BE
- - UNIVAC 1100/OS
- # - IBM/370 MVS

Company Name : UNIVERSITY COMPUTING COMPANY

Headquarters Address : 1930 Hi Line Drive, Dallas, TX 75207

Product Name : ENGINEERING MANAGEMENT LIBRARY

Number of years commercially available : 9

Date of last up-date or improvement : January, 1977

Approximate number of current users :

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact : Product Manager

Telephone No.: (214) 655-8894

## General Description

**N5500** (Project Planning and Control) - Developed by Nichols & Company, this state-of-the-art project planning and control system enables project leaders and managers to dramatically improve planning efficiency, highlight future loads, and quickly indicate potential problem areas.

- 

**EZPERT** The EZPERT Project Graphics System is the completely automated graphics system which provides comprehensive graphical management reports concerning status, cost, and resources throughout the planning, scheduling, and control phases of a project.

- 

**NETWORKS**

**GANTT BARCHARTS**

**X-Y GRAPHS**

**PMCS** (Piping Materials Control System) - PMCS developed by Halcon Computer Technologies allows total material control of every aspect of complex piping projects from estimation to final erection of the project. The system can help generate initial estimates more accurately and quickly, control material requisitioning, and monitor work flow. It can also control multiple piping projects simultaneously.

- #

## Special Features

UCC Engineering Libraries are available on one or more of the CDC, IBM, or UNIVAC systems as indicated by the following keys:

@ - UCC 1108 EXEC

\* - CDC NOS/BE

• - UNIVAC 1100/OS

# - IBM/370 MVS



Company Name : UNIVERSITY COMPUTING COMPANY

Headquarters Address : 1930 Hi Line Drive, Dallas, TX 75207

Product Name : PIPE STRESS, PIPE LINE TRANSMISSION LIBRARY

Number of years commercially available : 9

Date of last up-date or improvement : January, 1977

Approximate number of current users :

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact : Product Manager

Telephone No.: (214) 655-8894

### General Description

#### PIPE STRESS

ADLPIPE \*

AUTOFLEX @\*

DYNAFLEX @\*

EZFLEX @

FLANGE DESIGN (Part of Vessel) @

TRIFLEX @\*

WERCO @

#### PIPE LINE TRANSMISSION

INTERCOMP \*

### Special Features

The UCC Pipe Stress, Pipe Line Transmission Library is available on one or more of the CDC, IBM, or UNIVAC Systems as indicated by the following keys:

- @ - UCC 1108 EXEC
- \* - CDC NOS/BE
- - UNIVAC 1100/OS
- # - IBM/370 MVS

Company Name : UNIVERSITY COMPUTING COMPANY

Headquarters Address : 1930 HI Line Drive, Dallas, TX 75207

Product Name : PROCESS, CHEMICAL & VESSEL LIBRARY

Number of years commercially available :

Date of last up-date or improvement :

Approximate number of current users :

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact : Product Manager

Telephone No.: (214) 655-8894

## General Description

### PROCESS ENGINEERING

AMOCO (Sulphur Recovery Program) @

CHEMSHARE

DESIGN @

DISTILL @

REFINE (Refinery Crude, Vacuum Towers) @

NGPA (GPA K&H Program) @

SSI/100 PROCESS SIMULATOR @

SSI/DR01 PROCESS PROGRAM @

SSI/PROCESS •\*

### CHEMICAL

IRIS (Infrared Information System) @

PDSMS (Powder Diffraction Search & Match System) @

### VESSEL DESIGN

VESSEL

NOZZLE CLIP STRESS ANALYSIS @

FLANGE DESIGN OR ANALYSIS @

HORIZONTAL ESTIMATION AND DESIGN @

VERTICAL ESTIMATION, DESIGN AND ANALYSIS @

WERCO @

## Special Features

The UCC Process, Chemical and Vessel Library is available on one or more of the CDC, IBM or UNIVAC systems as indicated by the following keys:

@ - UCC 1108 EXEC

\* -CDC NOS/BE

• - UNIVAC 1100/OS

# - IBM 370/MVS



Company Name : UNIVERSITY COMPUTING COMPANY

Headquarters Address : 1930 Hi Line Drive, Dallas, TX 75207

Product Name : STRUCTURES LIBRARY

Number of years commercially available :

Date of last up-date or improvement :

Approximate number of current users :

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact : Product Manager

Telephone No.: (214) 655-8894

### General Description

#### STRUCTURES — GENERAL

ANSYS (Engineering ANAlysis SYStem) \*@

KSHEL \*

NASTRAN/MacNeal-Schwendler \*

PCA (Concrete Structures Programs) \*@

POSTEN (Concrete Structures) •

SACM (Surface Approximations, Contour Mapping) \*

SEPS1-5 @\*

SPACE IV @\*

STRUDL-II (Structural Design Language) •

SUPERTAB (Finite Element Interactive Graphics) \*

TRI\*DRILL (Drilled Footing Program) @

#### MARINE STRUCTURES

MRI/MARRS (Marine Riser Response COM. PROG. SYS.) \*

SACS III (Structural Analysis for Offshore Platforms) \*

AUTOGEN \*

DYNPAC \*

DYNRISER (Dynamic Riser Analysis) \*

PSI (Pile-Soil Interaction) \*

SEASTATE (Ocean Wave Simulator) \*

SHIP HULL CHARACTERISTIC SYSTEM @\*

### Special Features

The UCC Structures and Marine Structures Library are available on one or more of the CDC, IBM or UNIVAC systems as indicated by the following keys:

@ - UCC 1108 EXEC

\* - CDC NOS/BE

• - UNIVAC 1100/OS

# - IBM 370/MVS





Company Name : UNIVERSITY COMPUTING COMPANY

Headquarters Address : 1930 HI Line Drive, Dallas, TX 75207

Product Name : UCC-APT

Number of years commercially available :

Date of last up-date or improvement : January, 1977

Approximate number of current users : Several Hundred (Services & Software)

Purchase price if available on in-house equipment : Quote on request

Type(s) of equipment compatible for in-house use : UNIVAC 1100 Series; IBM 360/370; DEC PDP/11

Headquarters contact : Product Manager

Telephone No.: (214) 655-8886

### General Description

The APT processor, written in FORTRAN, has been designed to simplify programming of NC machine tools, thereby increasing NC programmer efficiency.

APT is an English-like language processor jointly developed by the member companies of the Aerospace Industries Association and the Massachusetts Institute of Technology. More than 100 man-years were expended in its original writing that began in 1957.

Today the UCC-APT system includes numerous features which were developed by UCC to make programmers more productive, thus saving considerable time in creating NC tapes. During years of involvement with the NC community, UCC has amassed a library of over 2000 proven postprocessors which save considerable time and money in getting new NC machines into production.

UCC-APT is a powerful, easy to use language processor for programming Numerical Control machine tools. UCC-APT is machine tool independent, allowing the user to program any type of NC machine and allows three axis contouring through a "plane" part surface.

UCC-APT is upward compatible from standard APT languages and includes many time-saving features not available in other NC processors.

UCC-APT produces a standard *CLFILE*; an IBM type *CLFILE* or vocabulary table is available for IBM systems.

### Special Features

#### USER ORIENTED FEATURES:

- UCC's APT Advanced Contouring allows the user to program the most complex multi-axis machines or any part requiring sophisticated geometric shapes such as conics or ruled surfaces. Also included are special area clearance and automatic contouring features. The Advanced Contouring Module becomes an integral part of UCC-APT.
- APT Lathe Module is a user-oriented language to simplify lathe programming. The Lathe Module, using a shortcut, shop type language, automatic threading and area clearance routines can reduce coding by 2/3 while increasing programmer productivity by even greater amounts. The Lathe Module becomes a part of UCC-APT and is also available for use with IBM APT and UNIVAC APT.





COMPANY INDEX

Agile Corporation .....	IX.020
<b>CallData Systems, Inc.*</b> .....	IX.040-IX.043
Comshare, Incorporated .....	IX.060
<b>Data Resources, Incorporated</b> .....	IX.080
Decisionex, Inc. ....	IX.100-IX.101
<b>Honeywell, Datnetwork</b> .....	IX.120-IX.122
<b>Informatics Inc.</b> .....	IX.140-IX.141
<b>Interactive Market Systems, Inc.</b> .....	IX.160
National CSS, Inc. ....	IX.180-IX.181
<b>On-Line Systems, Inc.</b> .....	IX.200-IX.203
PRC Computer Center, Inc. ....	IX.220
<b>Rapidata, Inc.</b> .....	IX.240-IX.242
Remote Computing Corporation .....	IX.260-IX.263
<b>Scientific Time Sharing Corporation</b> .....	IX.280-IX.281
System Automation Corporation .....	IX.300
<b>Warner Computer Systems, Inc.</b> .....	IX.320

\*Companies shown in **bold print** are Corporate Associate Members of ATSU.

SUBJECT INDEX

AIRCRAFT NOISE

INTEGRATED NOISE MODEL .....	CallData Systems, Inc. ....	IX.041
------------------------------	-----------------------------	--------

BANKING

MSB/SLP .....	Remote Computing Corporation .....	IX.262
RCR .....	Remote Computing Corporation .....	IX.263

BROKERAGE

LMS SYSTEM .....	Remote Computing Corporation .....	IX.260
MERLIN .....	Remote Computing Corporation .....	IX.261
OASES .....	On-Line Systems, Inc. ....	IX.200

DATA ENTRY

SCREEN .....	On-Line Systems, Inc. ....	IX.203
--------------	----------------------------	--------

FINANCIAL MANAGEMENT

CMS .....	Honeywell, Datnetwork .....	IX.120
FINANCIAL MANAGEMENT SYSTEMS ....	System Automation Corporation .....	IX.300

(Over)

## **INSURANCE**

AIPS .....	Warner Computer Systems, Inc. ....	IX.320
MUFU PROGRAMS .....	Rapidata, Inc. ....	IX.240

## **LEASE ANALYSIS**

MLA .....	Decisionex, Inc. ....	IX.100
-----------	-----------------------	--------

## **MANUFACTURING**

IMS/66 .....	Honeywell, Datanetwork ....	IX.121
PSC/66 .....	Honeywell, Datanetwork ....	IX.122

## **MARKET RESEARCH**

IMS SYSTEMS .....	Interactive Market Systems, Inc. ....	IX.160
-------------------	---------------------------------------	--------

## **MATHEMATICAL PROGRAMMING**

TEMPO .....	Data Resources, Inc. ....	IX.080
-------------	---------------------------	--------

## **METALS PRODUCTION**

OLSMOP .....	On-Line Systems, Inc. ....	IX.201
--------------	----------------------------	--------

## **MODELING SYSTEMS**

DYNAMO II .....	PRC Computer Center, Inc. ....	IX.220
-----------------	--------------------------------	--------

## **PERSONNEL**

PROFILES .....	Comshare, Inc. ....	IX.060
----------------	---------------------	--------

## **PROGRAM ANALYSIS**

INCOBUG .....	CallData Systems, Inc. ....	IX.040
SYMBUG .....	CallData Systems, Inc. ....	IX.043

## **PROJECT PLANNING**

PREMIS .....	Informatics, Inc. ....	IX.140
--------------	------------------------	--------

## **REAL ESTATE**

QUICK .....	Decisionex, Inc. ....	IX.101
QUICK .....	Informatics, Inc. ....	IX.141

## **WORD PROCESSING**

FULLTEXT .....	Scientific Time-Sharing Corp. ....	IX.280
READABILITY ANALYSIS .....	Scientific Time-Sharing Corp. ....	IX.281
RUNOFF .....	Rapidata, Inc. ....	IX.242
SCRIPT .....	CallData Systems, Inc. ....	IX.042
SCRIPT .....	National CSS, Inc. ....	IX.180
TEXT .....	On-Line Systems, Inc. ....	IX.202
WORD PROCESSING PACKAGE .....	Agile Corporation .....	IX.020

## **VOICE RESPONSE**

RAPIDVOICE .....	Rapidata, Inc. ....	IX.241
VOXTONE .....	National CSS .....	IX.181



Company Name : **AGILE CORPORATION**  
Headquarters Address : **1050 Stewart Drive, Sunnyvale, CA 94086**

Product Name : **WORD PROCESSING PACKAGE**  
Number of years commercially available : **1+**  
Date of last up-date or improvement : **August, 1978**  
Approximate number of current users : **500**  
Purchase price if available on in-house equipment : **\$300.00**  
Type(s) of equipment compatible for in-house use : **Agile Model A-1**  
Headquarters contact : **Nick Sackerson** Telephone No.: **(408) 735-9904**

### General Description

The Agile "Word Processing Package" firmware option is a combination of justification with word wrap-around and true proportional spacing. The proportional spacing is accomplished with a proportional spaced print font in conjunction with appropriate firmware to tell the print mech. the required spacing for each character.

JUSTIFICATION MODE processes text being transmitted to the terminal by printing each line such that the first and last characters of the line (terminated by CR-LF) line up on the user-defined left and right margins. The Option performs justification by inserting or deleting 1/120 inch increments between words and characters within a word. The maximum values for the number of increments that may be inserted or deleted between words or characters can be set by the user, or the default values built into the Option may be used. Interword spacing is altered to the maximum before intercharacter spacing is changed. A line that is much too long to fit within the margins is printed with the minimum spacing and extends past the right margin. A line that is too short (such as the last line of a paragraph) is printed either with the spacing of the previous line or the default 10 or 12 pitch, whichever is greater.

In WORD WRAP—AROUND MODE, the terminal checks at each word boundary (space or CR-LF) to determine if enough data has been received to print a line. The line is then printed justified to the margins with excess words wrapped around and placed on the next print line. Note that a CR-LF is treated as a space and does not necessarily terminate a line. This is in contrast to simple justification mode, in which each printed line has exactly the same number of words as transmitted to the terminal. To unconditionally terminate a line, enter CR-LF-CR-LF. This should be used to terminate a paragraph.

### Special Features

- Automatic centering, which is accomplished with a single command.
- Underscore, which is turned on with one command and shut off with a second command.
- Overstrike, which is accomplished using a single command to turn on and off.
- Dual column mode, allow proportionally spaced, justified text to be printed in two columns.

Date: **November, 1978**

Submitted By: **Nick Sackerson, Sales Manager**



Company Name : **CALLDATA SYSTEMS, INC.**

Headquarters Address : **20 Crossways Park N., Woodbury, NY 11797**

Product Name : **INCOBUG**

Number of years commercially available : **5**

Date of last up-date or improvement : **July, 1977**

Approximate number of current users :

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use : **AMDAHL 470V/5**

Headquarters contact : **Aron Prochko** Telephone No.: **(516) 575-6558**

### **General Description**

Our Interactive CObol DeBUGger (INCOBUG) is a software system that provides the COBOL programmer facilities for execution time debugging at the symbolic or source level. INCOBUG raises the level of program debugging since no knowledge of machine language or hexadecimal arithmetic is required.

Invoked as a compile time option, INCOBUG halts execution at all breakpoints. Initially all paragraph names are breakpoints, but execution can also be halted at individual statements. The user can then display any data-item, continue on, start in another location, or end the program. All program interrupts are trapped, the appropriate message is displayed and the user is given control. He can then correct the program and continue processing. Therefore, with one compilation, a programmer can effectively debug his entire program.

INCOBUG is more than just another debugging tool; it is an entire power-house comprised of a wide range of facilities, designed to assist the programmer in the perception and elimination of programming errors from a terminal.

### **Special Features**

- Ability to dynamically alter the logical program flow.
- Traps all program abends, displays the cause and location, and gives the user control.
- The user can alter the contents of any data name.
- Data elements can be displayed as character, numerical or hexadecimal.
- The ability to examine the content and status of any external file(s).

Company Name : CALldata SYSTEMS, INC.

Headquarters Address : 20 Crossways Park N., Woodbury, NY 11797

Product Name : INTEGRATED NOISE MODEL

Number of years commercially available : 2

Date of last up-date or improvement :

Approximate number of current users :

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use : AMDAHL 470V/5

Headquarters contact : Aron Prochko

Telephone No.: (516) 575-6558

## General Description

The INTEGRATED NOISE MODEL (INM) provides a method for characterizing aircraft noise near airports. It includes a determination of the total time that the sound level exceeds certain thresholds, and also the equivalent A-weighted sound level (Leg), and the day-night average sound level (Ldn) at a number of points surrounding a particular airport. Thus, several methodologies are integrated into a single model which provides a picture of the noise environment. In addition to the total exposure per day, the exposures occurring during the more sensitive evening hours (7 P.M. to 10 P.M.) and night hours (10 P.M. to 7 A.M.) are presented separately.

In addition to a tabular report, a graphical plot is provided. This plot presents the contours of equal exposure duration at levels above 85 dBA. Contours depicting the entire area receiving 85 dBA exposure, and the areas receiving more than 2 minutes and more than 15 minutes per day in excess of 85 dBA are provided.

An option available to the user provides a plot of Ldn contours instead of equal duration contours described above. A tabular report is produced for points within the outermost Ldn contours. Contours of 65 Ldn and 75 Ldn and user supplied Ldn levels are provided.

Noise data for common aircraft types are provided by the INM library. Data for both standard and retrofitted (FAR-36) aircraft for both take-off and landing procedures are included. Other aircraft data or changes to the library values may be specified by the user.

## Special Features

- Times above threshold computed using six different thresholds, from 65 dBA to 115 dBA.
- Computation is performed for day and night to account for schedule and meteorological differences.
- An optional Calcomp contour map of the noise levels is produced.
- A library of commonly used commercial and general aviation aircraft and their engine characteristics is provided.
- Leg or Ldn analysis.





Company Name : CALldata SYSTEMS, INC.  
Headquarters Address : 20 Crossways Park N., Woodbury, NY 11797

Product Name : SCRIPT  
Number of years commercially available : 5  
Date of last up-date or improvement :  
Approximate number of current users :  
Purchase price if available on in-house equipment :  
Type(s) of equipment compatible for in-house use : AMDAHL 470V/5  
Headquarters contact : Aron Prochko Telephone No.: (516) 575-6558

## General Description

SCRIPT provides the CMS user with an easy-to-use tool for managing textual documents. The user has total control and complete flexibility in the formatting and organization of his file(s).

There are over 80 commands in the SCRIPT repertoire. These commands are inbedded within the text and are interpreted by the SCRIPT processor as it reads each line of the file.

The CMS Editor is used to manage the SCRIPT files. The Editor provides an easy means to create, change and delete your textual data. The user may therefore maintain many SCRIPT files and envoke them as required.

Output can be formatted for either an on-line terminal, the high-speed printer at the computing center or at a remote station. The quality of the final product is enhanced with an upper/lower case printer, durable bond paper and film ribbons. Higher quality documents can be produced by using our computerized COMP/80 typesetting machine.

## Special Features

Several powerful features are available with SCRIPT:

- Selected marking in the left margin with a revision code character.
- Automatic generation of a table of contents and index.
- Ability to enter footnotes at convenient places in the input. Footnotes are saved and printed at the bottoms of output pages.
- Use of symbolic "reference names" to simplify numbering and cross-referencing.
- Automatic hyphenization.
- Use of Roman numerals instead of Arabic, in page numbers and in conjunction with the heading and footing controls.
- Conditional control of output.
- User prompting for inserting data within the text.
- Translation table pairs for expansion of a code into longer text.
- Left and right margin justification.

Company Name : CALldata SYSTEMS, INC.

Headquarters Address : 20 Crossways Park N., Woodbury, NY 11797

Product Name : SYMBUG

Number of years commercially available : 3

Date of last up-date or improvement :

Approximate number of current users :

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use : AMDAHL 470V/5

Headquarters contact : Aron Prochko

Telephone No.: (516) 575-6558

## General Description

SYMBUG is a software system that provides the FORTRAN programmer facilities for execution time debugging at the symbolic or source level. SYMBUG raises the level of program debugging since no knowledge of machine language or hexadecimal arithmetic is required.

Invoked as a compile time option, SYMBUG halts execution of the program at all breakpoints. Initially no breakpoints exist but are set by the user with a command. Breakpoints may be referenced by any live number or any sequence number. SYMBUG dynamically monitors the execution and enables the programmer to examine data, change data and even 'patch' his program, all at execution time.

All program interrupts are trapped, the appropriate error message is displayed and the user is given control. He can then correct the program and continue processing. Therefore, with one compilation, a programmer can effectively debug his entire program.

SYMBUG is more than just another debugging tool; it is an entire power-house comprised of a wide range of facilities, designed to assist the FORTRAN programmer in the perception and elimination of programming errors from a terminal.

## Special Features

- Ability to dynamically alter the logical program flow.
- Traps all program abends, displays the cause and location, and gives the user control.
- The user can alter the contents of any data name.
- Data elements can be displayed as character, numerical or hexadecimal.
- Use of conditional if-then testing of the contents of up to three data elements.
- Procedural capability of SYMBUG commands.
- On-line assistance provided by the HELP command.
- Maintains a frequency distribution of the execution of each FORTRAN statement.
- The ability to examine the content and status of any external file(s).



Company Name : COMSHARE, INCORPORATED

Headquarters Address : 3001 South State Street, Ann Arbor, MI 48104

Product Name : PROFILES

Number of years commercially available : 4

Date of last up-date or improvement : Continuous

Approximate number of current users : 150

Purchase price if available on in-house equipment : n.a.

Type(s) of equipment compatible for in-house use : n.a.

Headquarters contact : Stan Starkey

Telephone No.: (313) 994-4800

### General Description

PROFILES is a human resource information management system that provides tools for administrative reporting, salary administration and budget control, labor relations, management development, personnel research and forecasting, manpower planning, defined contribution plan record keeping, employee benefit statements and database maintenance. Because it is an interactive system, it permits the personnel manager to access, modify, analyze, project or report on employee data at any time.

PROFILES responds to simple English commands and does not require the personnel expert to also be a computer specialist. Installation schedules allow a customer to be fully operational in a matter of weeks, and in some cases, days.

Because PROFILES is quickly installed and flexible to use, the system has proven especially invaluable to companies experiencing government pressure for proof of compliance under federal regulations. Once such companies organize their employee data with PROFILES, they can readily extract information for standard affirmative action reports, or for special analysis.

### Special Features

- Client support by trained Human Resource consultants.
- Comprehensive Personnel reporting capability accessible in total or through individual product modules addressing functional areas of Personnel.
- Standardized reporting system with pre-determined items of information required and predictable costs.
- Special ad hoc reporting providing instantaneous answers to unexpected questions or initiating one-time analysis reports to identify adverse trends or exceptions.
- Graphic capabilities in the form of bar charts, crosstabulations and plotting, ideal for one time analysis.
- Control of company data by user groups only.
- Extensive statistical capabilities.



Company Name : DATA RESOURCES, INCORPORATED

Headquarters Address : 29 Hartwell Avenue, Lexington, MA 02173

Product Name : TEMPO Mathematical Programming System

Number of years commercially available : 6

Date of last up-date or improvement : February, 1978

Approximate number of current users : 90

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact : Larry V. Moore, Director -Appl. Sys. Dev.

Telephone No.: (617) 861-0165

### General Description

The TEMPO Mathematical Programming System is a complete linear, separable nonlinear, and integer programming system developed by Burroughs Corporation and modified by Data Resources, Inc., for use on the DRI system. It offers the latest advances in computing techniques for linear programming and its extensions. Flexible data management facilities provide control over model generation, problem solution, and report writing, plus communication with modelling, graphics, and report-writing software in DRI's Econometric Programming System (EPS) and APL interactive programming system.

TEMPO offers the efficiency and capacity of a full-scale mathematical programming system for both interactive and economical batch mode operation. The free-format natural-language TEMPO Control Language allows the interactive user to create or revise a model, control the solution strategy, and review full or selected results on-line—or to specify a complete off-line solution procedure for models large enough to warrant unattended solution. A macro facility allows the user, or his DRI consultant, to set up sophisticated custom-tailored update, solution, and reporting procedures for use by non-technical personnel.

### Special Features

- Solves problems with up to 65,535 rows and any number of columns.
- Complete interactive matrix input and revision facilities.
- Accepts MPSX and SHARE input data formats.
- Automatic controls for candidate vector selection, partial pricing, and reinversion.
- Complete postoptimal analysis facilities, including Ranging, Parametrics, and Composite right-hand side and cost row.
- Extended branch and bound for integer and mixed-integer solutions.
- Can terminate and restart a run from advanced bases.
- Flexible interpolation procedures for nonlinear separable functions.



Company Name : **DECISIONEX, INC.**

Headquarters Address : **1200 Post Road East, Westport, CT 06880**

Product Name : **MLA**

Number of years commercially available : **2**

Date of last up-date or improvement : **June, 1978**

Approximate number of current users : **5**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Herbert Terry**

Telephone No.: **(203) 226-7424**

## General Description

**MLA is a system for Multiple Lease Analysis which develops cash flows for shopping centers with up to 150 leases. The system permits projection and summarization of base rent, percent rent, and tenant contributions for typical shopping center operating expenses.**

**The system simulates specific lease provisions and formulae which, when projected on a monthly time frame, produce a more realistic picture of investment potential and risk than manual approaches.**

**In addition to summary financial information, the system provides detail reports for each lease, expiration analysis, sub-total reports by tenant type, and rent roll report.**

**The MLA system is available on Burroughs Corporation time sharing utility and is recommended for use in conjunction with Decisionex consulting services.**

## Special Features

**The system provides two major benefits for current or prospective shopping center investors:**

- **Improve operational results for current holdings by projecting cash flow trends and thereby developing a realistic basis for renegotiation of expiring leases; for making a sell vs. hold decision.**
- **Obtain better results from an investment program as a result of access to more incisive information for evaluation, negotiation and deal structuring.**



Company Name : DECISIONEX, INC.  
Headquarters Address : 1200 Post Road East, Westport, CT 06880

Product Name : QUICK  
Number of years commercially available : 6  
Date of last up-date or improvement : July, 1978  
Approximate number of current users : 80  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : Herbert Terry  
Telephone No.: (203) 226-7424

## General Description

QUICK is a flexible computer model for real estate appraisal and investment analysis. It is designed to facilitate the simulation of real estate investments even where highly complex and irregular elements are present. This provides a unique capability for analyzing and structuring real estate situations from either a buying or selling perspective, including tax implications.

Consideration of real world real estate problems may involve complexities or irregularities with respect to income, expenses, tax rates, financing terms, and depreciation. These interacting elements can easily be handled by the QUICK system to provide a realistic projection of the consolidated effects of these variables.

User control by means of English-language statements enables real estate personnel with no data-processing background to quickly obtain sophisticated reports on a routine basis. The ease, and nominal cost of varying investment assumptions for appraisal, real estate counseling or deal structuring purposes make this powerful model truly outstanding.

QUICK was developed by Decisionex, Inc. of Westport, Connecticut. It is currently available on the Burroughs Corporation time-sharing utility.

## Special Features

The model may be used to advantage for these types of properties, or in these investment contexts:

- Stabilized or complex income producing properties — (detailed income and expenses with irregular flows...component depreciation...tax rate assigned on a year by year basis... possible refinancing, balloon payments, or interest-only loans...nondeductible costs, future capital improvements, additional equity payments and various methods of projecting residual values).
- Simple or complex construction projects; Buy vs. Lease Analysis.
- Financial analysis of multi-asset or multi-lease properties such as office buildings and shopping centers.
- General cash flow analysis.





Company Name : HONEYWELL DATANETWORK

Headquarters Address : Honeywell Plaza, Minneapolis, MN 55408

Product Name : CASH MANAGEMENT SYSTEM (CMS)

Number of years commercially available : 1

Date of last up-date or improvement : January, 1978

Approximate number of current users : n.a.

Purchase price if available on in-house equipment : Available upon request

Type(s) of equipment compatible for in-house use : Honeywell 6000, Series 66

Headquarters contact : DATANETWORK Customer Service

Telephone No.: (612) 870-6000

### General Description

The Honeywell DATANETWORK Cash Management System (CMS) provides control information on bank performance, provides cash status information and supports the debt and investment portfolio management of a corporation.

The Cash Management System allows a user to monitor bank performance and rates for services provided and to optimize the cash balance levels both between banks and between accounts to minimize bank service charges. The system gathers and records cash status changes daily to support fund balance management, thereby ensuring that all accounts are maintained at adequate levels, while excess fund balances are quickly identified for investment or transfer action. In addition, the system records and supports the short-term borrowing and investment strategy decisions required in the day-to-day activities of a corporation.

The Cash Management System consists of three independent subsystems. These are: **BANK ANALYSIS REPORTING** - The purpose of the BAR system is to provide control information on bank performance and to support the selection of which bank can most economically provide which services; **CASH ANALYSIS REPORTING** The purpose of the CAR system is to provide cash status information to the cash manager on a timely basis to support borrowing and investment decisions; **HONEYWELL AUTOMATED BORROWING AND INVESTMENT TECHNIQUE** - The HABIT system records daily on computer files the companies short term borrowing activity, including detail on commercial paper, fixed term bank notes, master notes and variable notes. It also records short term investment activity. HABIT produces comprehensive borrowing and investment management control summary reports.

### Special Features

#### BAR FEATURES:

- Bank rate comparisons
- All bank summaries
- 12 month history retention
- Average balance calculations

#### CAR FEATURES:

- Balance reporting with target balance comparisons
- Daily lock box reporting with weekly and monthly summaries
- Month-to-Date account averages reported daily
- Highlights funds available for use elsewhere

#### HABIT FEATURES:

- Borrowing and investment maturity schedules for cash strategy planning
- Borrowing cost versus investment return comparison summaries





Company Name : **HONEYWELL DATANETWORK**

Headquarters Address : **Honeywell Plaza, Minneapolis, MN 55408**

Product Name : **INVENTORY MANAGEMENT SYSTEM (IMS/66)**

Number of years commercially available : **5**

Date of last up-date or improvement : **April, 1978**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **Available upon request**

Type(s) of equipment compatible for in-house use : **Honeywell Series 6000, Series 66**

Headquarters contact : **DATANETWORK Customer Service** Telephone No.: **(612) 870-6000**

### General Description

IMS/66, is transaction oriented and built around a common data base. IMS/66 features exception processing and net change material requirements and priority planning. It encompasses bill of materials processing, inventory control, statistical forecasting, material requirements planning and product costing while controlling shipments and supply orders through its order release and feedback functions.

IMS/66, supporting inventory management, can be combined with Honeywell's Production Scheduling and Control/66, a versatile operating tool for planning and controlling production capacities and in-process inventories. Together, IMS/66 and PSC/66 provide total control over factory resources, with IMS/66 addressing the demands for material and PSC/66 controlling the use of facilities.

**DATA BASE APPROACH:** In a discrete-item manufacturing organization the end product is usually described with a product structure, made up of the parts and assemblies of the end product. This product structure information must be easy to maintain and readily available for multiple use. To simplify file maintenance and avoid duplication of information, IMS/66 uses Integrated Data Store, a technique for file structuring and data manipulation. Because of I-D-S, information in the IMS/66 data base is captured and recorded only once. Each data element is physically associated to every other element with which it is logically related.

IMS/66 is made up of eight integrated subsystems, File Control, Demand Entry, Statistical Forecasting, Feedback, Requirements Planning, Order Release, Cost, and Inquiry. Any subsystem can be run independently of any other.

### Special Features

- Builds and maintains a product structure file.
- Accepts external demands in the form of master schedules and customer orders against assemblies, sub-assemblies, or parts.
- Explodes supply orders through the product structure.
- Controls the release of supply orders and shipments.
- Develops and maintains priorities to meet assembly and shipping schedules.
- Generates and maintains standard product costs.
- The system reacts dynamically to changes in inventory demand.
- Single- and multiple-level pegging of orders and their respective demands is available.
- Released supply orders can be modified to reflect more realistic priorities.
- Material availability is checked and component material reserved (allocated) when supply orders are released.(...and many more)



Company Name : **HONEYWELL DATANETWORK**

Headquarters Address : **Honeywell Plaza, Minneapolis, MN 55408**

Product Name : **PRODUCTION SCHEDULING & CONTROL (PSC/66)**

Number of years commercially available : **4**

Date of last up-date or improvement : **August, 1978**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **Honeywell Series 6000, Series 66**

Headquarters contact : **DATANETWORK Customer Service** Telephone No.: **(612) 870-6000**

### General Description

**PSC/66 BULLETINS:** PSC/66 Comprises three fully programmed, pretested, modular subsystems: Production Data Management System - maintains complete descriptions of workcenters and routings, updating these from new manufacturing planning and capacity data; Capacity Requirements Planning Subsystem - schedules, and loads planned and released orders into workcenters; Production Control Reporting Subsystem - closely monitors all phases of shop activity against planned performance standards.

**INTEGRATION WITH IMS/66:** Together, PSC/66 and Honeywell's Inventory Management System/66 can create a powerful manufacturing information and control system. PSC/66 and IMS/66 can provide total control over factory resources, with IMS/66 addressing the demands for materials and PSC/66 controlling the use of facilities.

The data base is structured by Honeywell's Integrated Data Store (I-D-S), a total file maintenance system. I-D-S simplifies transaction processing by storing each element of routing, workcenter and work-in-process data in only one place on a random access device. It also creates and maintains all the required data relationships. Since relationships join associated data, there is little redundancy. Data maintenance is also simplified; only a few straightforward verbs-such as STORE, RETRIEVE, DELETE and MODIFY-keep the data current at all times.

**PSC/66 offers the following benefits:** Smaller in-process inventories; better services to customers; shorter manufacturing cycle time; improved availability of components; reduced expediting; higher employee and workcenter performance; smoother day-to-day operation; reduced clerical effort; reduced system implementation time; improved capacity planning.

### Special Features

**PSC/66 offers many features that stress simplified use and operation flexibility:**

- Easily understood system concepts
- Calculation and maintenance of priorities
- Forward and backward scheduling
- Automatic rescheduling changed orders
- Scheduling on an expedite or exception basis
- Shop order cost calculation and monitoring
- Capability for inserting operational text in routings
- Scheduling of critical materials or tooling by specific operation
- Automated routing retrieval & shop paper generation
- Simplified user feedback options
- Full complement of easily read reports
- Easy adaption and maintenance via I-D-S/COBOL



Company Name : **INFORMATICS INC. DATA SERVICES DIVISION**

Headquarters Address : **6 Kingsbridge Road, Fairfield, NJ 07006**

Product Name : **PREMIS (Product of K & H Consultants)**

Number of years commercially available : **3**

Date of last up-date or improvement : **September, 1978**

Approximate number of current users : **20**

Purchase price if available on in-house equipment : **\$40,000**

Type(s) of equipment compatible for in-house use : **IBM 360, 370; OS, OS/VS**

Headquarters contact : **Paricwehr Hanly**

Telephone No.: **(201) 575-9610**

### **General Description**

**Project Resource Evaluation and Management Information System (PREMIS) is a comprehensive project control system using the Precedence (PDM) or Arrow (ADM) network technique of representing the logical inter-relationships between the activities which comprise a complete project.**

**PREMIS can provide management with information in a clear and concise form on which to base decisions e.g. to make resources available for the project, to ensure that the project is completed on schedule or to ensure that the project is completed within cost and man-hour budgets (time constraint). The sophisticated resource analysis and scheduling capabilities of PREMIS can provide management with answers or insights into practical alternatives where projects are constrained by resources or time.**

**PREMIS can operate within a hierarchical responsibility structure that is often found in a large organization with many areas of application. Smaller organizations may require fewer levels within their hierarchical structure.**

**There are six levels within this structure of which the last five are available to the user: SYSTEM; SUB SYSTEM; PROJECT; SUBNET; ACTIVITY; and DETAIL.**

**In summary, PREMIS may be thought of as a PROJECT MANAGEMENT AND INFORMATION SYSTEM GENERATOR.**

### **Special Features**

**VERSATILE REPORTING SYSTEM - PREMIS offers extremely flexible report generation facilities and the user can select only that information which is relevant to the various levels within the management structure. The powerful sorting and report writing facilities of PREMIS can be used to provide virtually any format of detailed reports at the lowest hierarchical level (activity, detail) sorted in any desired sequence for operations on-site or summary reports for higher management.**

**EASE OF DATA INPUT/UPDATE - PREMIS has integrated input and update generation facilities which can accept many different formats of input and update data at the activity or detail levels, which can be converted to a standard format within PREMIS for processing. This facility is particularly useful for large projects.**



Company Name : **INFORMATICS INC. DATA SERVICES DIVISION**

Headquarters Address : **6 Kingsbridge Road, Fairfield, NJ 07006**

Product Name : **QUICK**

Number of years commercially available : **2**

Date of last up-date or improvement : **September, 1978**

Approximate number of current users : **50**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **James T. Guastavino**

Telephone No.: **(201) 575-9610**

### General Description

**QUICK** is a discounted cash flow modelling capability for real estate investment analysis. Taking into account property price, resale value, tax rates, income, expenses, depreciation and financing, it develops effective yields to the investor both on a pre and post tax basis as well as several annual rates of return. In the process of performing an analysis, a series of some 15-20 reports are automatically generated and are selectively available to the user. The model can also store these analysis, combine them into a portfolio, and make analysis of the portfolio available via additional reports.

The model can work backwards to derive a current market value given one of five target rates of return. Sensitivity analysis on specific input variables can be used to determine the effects on calculated variables and on the return on investment measures.

A major advantage of **QUICK** is its ease of use; commands and input data names may be referred to in natural English language fashion. The user can cause the model to prompt for data input or he can make direct data assignments; multiple data items may also be assigned on a single line. Entry of data streams (e.g. cash flows) is facilitated by twenty distinct functions, which allow for easy propagation of numbers. Finally, the user can choose from twenty predesigned reports to view the results of the projection.

### Special Features

- Allows entry of multiple income and expense streams
- All accepted depreciation methods and recapture techniques as well as depreciation by components
- Multiple financing alternatives including interest only and balloon payments, interest accrual, additional amortization, refinancing, and delayed receipt/repayment of loans
- Future additional equity payments
- Multiple methods of specifying how the resale value is to be calculated, including the capitalization of NOI or pre-tax cash flow, a multiple of gross income, the current loan balance or the depreciated book value
- A report which analyzes the components of Ellwood and post-tax yields
- Pinpoints the time when a tax shelter has been exhausted
- Buy versus Lease Analysis
- Joint ventures
- User customized reports



Company Name : **INTERACTIVE MARKET SYSTEMS, INCORPORATED**

Headquarters Address : **19 West 44th Street, New York, NY 10036**

Product Name : **IMS SYSTEMS**

Number of years commercially available : **8**

Date of last up-date or improvement : **Continually being enhanced**

Approximate number of current users : **500**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Richard Makely, President**

Telephone No.: **(212) 869-8810**

## General Description

IMS offers 20 advertising and marketing systems for the retrieval, analysis and display of information from more than 30 syndicated research data bases. Reports, calculations and schedules concerning market and media planning can be produced. A selection of formats is available for output displays.

Manufacturers, services, ad agencies, media and research companies use IMS to provide advertising and marketing information. IMS users are primarily marketing and media planners, many with little or no computer experience.

The IMS systems process and analyse advertising and marketing data bases, either individually or in combination. These bases contain national, regional and local information, including demographic, media, and product data. The data bases with which IMS works include:

Arbitron TV  
Arbitron Radio  
Arms II  
Audits and Survey  
Axlom - TGI  
BAR-Network TV  
BAR Spot TV  
Belden Associates  
Brand Tracking Studies  
Canadian Print Meas. Bur.

Census  
Consumer Panel Data  
European Bus. Readers Study  
Middle Eastern Study  
Monroe Mendelsohn  
MRCA Textile Panel  
Nielsen Station Index  
Nielsen TV Index  
NPA  
NRS-U.K.  
Palshaw Measurement

J.D. Powers  
Purchase Influence  
ORC Youth  
Poik  
RSL-Pan Europe Study  
SAMI  
Simmons-SMRB  
SRDS  
Starch Elite  
TGI-U.K.  
TMI

## Special Features

Systems allow easy English language access to procedures and provides English language coding for major database information.

Offers integration of such disparate data-bases as BAR and ARB, TGI and ARB, Purchase Influence and W.R. Simmons.



Company Name : NATIONAL CSS, INC.  
Headquarters Address : 187 Danbury Road, Wilton, CT 06897

Product Name : SCRIPT  
Number of years commercially available : 1  
Date of last up-date or improvement : n.a.  
Approximate number of current users : n.a.  
Purchase price if available on in-house equipment : n.a.  
Type(s) of equipment compatible for in-house use : n.a.  
Headquarters contact : K. Kalin

Telephone No.: (203) 762-2511

## General Description

The SCRIPT package provides the user with an easily learned and manipulated set of commands for managing textual documents. The user retains full control over the format and organization of text files.

SCRIPT files contain a mixture of text and SCRIPT control words. Files are created and maintained with any contextual or line number editor, including the CMS editor.

There are over 110 SCRIPT control words which permit a fine, full range of formatting. There are a range of instructions for spacing, underscoring, blocking, tabbing, right and left justification, off-setting, indenting, boxing and window protection. Multi-columned page formats are possible using facilities for page layout definition, column balancing and switching between single and multiple columns.

Output may be directed to an on-line terminal, or a high-speed line printer at the computing center or at a remote station. Special mylar printer ribbons may be used to produce very high quality printing acceptable for reproduction by photo-offset printing.

## Special Features

**SYSTEM REFERENCE VARIABLES** - a large number of status indicators and system information variables.

**USER-DEFINED VARIABLES**

**LOGIC CAPABILITIES** - logical operators, built-in functions, automatically invoked MACROS.

**HYPHENATION DICTIONARY**

**INPUT OPTIONS** - Selected printing by page or line, screen formatting, pass control.

**SYSPUB** - automatic construction of Tables of Contents, Lists of Tables, Lists of Figures, Bibliographies, multiple indices.



Company Name : **NATIONAL CSS, INC.**

Headquarters Address : **187 Danbury Road, Wilton, CT 06897**

Product Name : **VOXTONE**

Number of years commercially available : **3**

Date of last up-date or improvement : **Continuous**

Approximate number of current users :

Purchase price if available on in-house equipment :

Type(s) of equipment compatible for in-house use :

Headquarters contact : **Kate Kalin** Telephone No.: **(203) 762-2511**

## General Description

The VOXTONE audio response unit allows a VP/CSS user to log into the system using a 12-button touch-tone telephone as a terminal input device. Application level programs running under CSS can, via a set of subroutine calls, cause words and sentences to be spoken over the Voxtone and can allow touch-tone button responses to be read by the programs. The touch-tone button takes the place of what normally would be an interactive terminal. Various devices and "cheap" terminals are manufactured that simulate touch-tone input (such a device could be used in an area where touch-tone telephone service is not available).

The VP/CSS support for the Voxtone is in three functional parts:

1. A set of subroutines calls to allow touch-tone input from the device and voice output to the device.
2. A dictionary mechanism to allow definition of words as a set of sounds or phonemes.
3. A stream-lined log-on procedure for logging onto VP/CSS with a minimum of button pushes. Voxtone users are automatically put into a mode whereby, all "noise" messages generated by VP/CSS applications are thrown away.

## Special Features

- Full alpha-numeric data entry.
- Simple generation of tables of standard responses.
- Easily created files of user-defined "canned" phrases.
- Control of inflection and speed.
- Coded procedures for speaking numerals.



Company Name : **ON-LINE SYSTEMS, INC.**Headquarters Address : **115 Evergreen Heights Drive, Pittsburgh, PA 15229**Product Name : **OASES**Number of years commercially available : **6 months**Date of last up-date or improvement : **March 31, 1978**Approximate number of current users : **20**Purchase price if available on in-house equipment : **n.a.**Type(s) of equipment compatible for in-house use : **n.a.**Headquarters contact : **William L. Nemanick**Telephone No.: **(412) 931-7600****General Description**

OASES (On-Line's Accessible Securities System) is a securities data base system that provides current and historical trading, financial, and descriptive information for approximately 30,000 security issues of all types. (The number of securities constantly changes because of normal business activity such as the expiration of options and the final payment of bonds.) The securities data base is updated daily, checked for potential errors, and carefully maintained to assure the highest level of data accuracy. OASES is broad in scope, efficient in operation, and economical to use.

The OASES securities library covers three main areas:

- **MASTER** information that consists of descriptive and status information and current fundamental data for all securities.
- **PRICE** information that consists of a 2-1/2 year history of daily volume and of high, low, and closing prices (or bid-ask prices).
- **DIVIDEND** information that consists of a 2-1/2 year history of dividend and stock distribution statistics for equity issues and bond interest payment data for debt issues.

OASES data can be retrieved through the use of stand-alone applications programs, FORTRAN subroutines, and the OLIVER data base management language.

**Special Features**Date: **November, 1978**Submitted By: **William L. Nemanick, Manager of Product Marketing**



Company Name : **ON-LINE SYSTEMS, INC.**

Headquarters Address : **115 Evergreen Heights Drive, Pittsburgh, PA 15229**

Product Name : **OLSMOP**

Number of years commercially available : **9**

Date of last up-date or improvement : **May, 1978**

Approximate number of current users : **11**

Purchase price if available on in-house equipment : **Negotiable**

Type(s) of equipment compatible for in-house use : **Hardware Independent**

Headquarters contact : **William L. Nemanick**

Telephone No.: **(412) 931-7600**

## General Description

**OLSMOP, Melt Optimization Package, is a collection of programs designed to serve the metals industry. Using MOP, a foundry can solve problems for a specific heat, reduce costs, and increase operating efficiency.**

**MOP provides:**

- **Fast, accurate charge and additions calculations.**
- **Flexibility in changes in production schedule and material availability.**
- **Automatic reporting of charge and additions computations, ordered weights, and predicted melt-in chemistry.**
- **Automatic preparation of inventory transaction reports for accounting.**
- **Standardization and control of melt shop practice.**
- **Inventory cost control.**
- **Review and analysis of product specifications and their effect on material cost.**
- **Quality control.**

**The package is easy to use and fast to implement, and can give immediate realization of savings in raw materials costs.**

## Special Features

**Many installation time option switches are available to customize the system to a users needs. Some of these options are:**

- **Metric Measurement**
- **Heat History Capture for Historical Data Base**
- **Standard Cost Calculations**
- **Various Print Options**
- **Various Computation Options**

Company Name : **ON-LINE SYSTEMS, INC.**

Headquarters Address : **115 Evergreen Heights Drive, Pittsburgh, PA 15229**

Product Name : **TEXT**

Number of years commercially available : **9**

Date of last up-date or improvement : **September, 1978**

Approximate number of current users : **100**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **William L. Nemanick** Telephone No.: **(412) 931-7600**

## General Description

**TEXT** is an interactive editing and document production system, applicable to many user areas. It is used in the composition of single and multipage documents, ranging from the basic letter to the complex proposal or directory.

**TEXT** can:

- Reduce the repetitive and time-consuming processes involved in document preparation.
- Provide flexibility in formatting - margins, tables, spacing, pagination, outlines, and so forth.

Using **TEXT**, textual material and instructions on the desired appearance of the document are entered at the terminal. Editing commands in the system allow the user to make minor changes, major modifications, or complete recompositions.

## Special Features

- Easy to learn and use
- A complete primer and reference manual
- Can be combined with graphics, information retrieval, and indexing systems
- Callable as a subroutine from FORTRAN programs



Company Name : **ON-LINE SYSTEMS, INC.**

Headquarters Address : **115 Evergreen Heights Drive, Pittsburgh, PA 15229**

Product Name : **SCREEN**

Number of years commercially available : **4**

Date of last up-date or improvement : **January, 1977**

Approximate number of current users : **100**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Paul Y. H. Chu**

Telephone No.: **(412) 931-7600**

## General Description

The SCREEN\* application package is designed to provide optimum usefulness and versatility in data entry, by utilizing Video Display Terminals. SCREEN reduces the programming effort and time required to develop an application and facilitates data entry.

The SCREEN\* package expands the versatility of VDT's by placing a user-designed form (mask) for data manipulation on the display area. This mask resembles a printed form, and the user places data into the form by filling in the appropriate blanks that appear on the screen. Once the form has been completed, it is sent to the computer for processing. After successful processing, the user input on the form is cleared, but the form remains on the screen. Then a new record can be created or an existing record can be displayed or edited.

## Special Features

- Forms exist in a file that is created and edited by the user to meet specific applications.
- Automatic validation for specific fields as defined in the mask file. Field types include numeric, monetary, and date, with many validation options allowed.
- Automatic prompting with specific error messages to correct and retransmit invalid fields.
- Available in both FORTRAN and COBOL.
- Automatic SCREEN program generator which interfaces to OLIVER, an interactive data base management system.
- Adaptability to many terminals.

Company Name : **PRC COMPUTER CENTER, INC.**

Headquarters Address : **7670 Old Springhouse Road, McLean, VA 22102**

Product Name : **DYNAMO II**

Number of years commercially available : **:**

Date of last up-date or improvement : **December, 1977**

Approximate number of current users : **Confidential**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **George A. Thompson, Jr., V.P.** Telephone No.: **(703) 893-4880**

## General Description

**DYNAMO** is a compiler for translating and running continuous models (models described by a set of differential equations). It was developed by the Industrial dynamics group at M.I.T. for simulating dynamic feedback models of business, economic, and social systems, but there is nothing in its design that precludes its use for any continuous system.

**DYNAMO** has been designed for the person who is problem-oriented rather than computer-oriented. It makes available easy to use computing facilities so that the user can focus his attention on building a useful model undistracted by complex computer requirements.

The mechanics of using **DYNAMO** are very simple. Output can be specified easily, yet both tabular and plotted output are available. Comparative plots simplify the measurement of the impact of policy and parameter changes on model results. Comparative tabular output will also be available shortly.

The ease of use includes trivial requirements on the order of equations and direction cards. Model initialization is simplified by **DYNAMO**'s automatic initialization of many variables.

For more experienced users **DYNAMO** offers two facilities to simplify the construction of large models. **DYNAMO** offers arrays to simplify the duplication of disaggregated sectors. **DYNAMO** offers user-defined macros as a means for the user to define his own functions within the **DYNAMO** equation system.

**DYNAMO** thoroughly checks a model for serious errors and reports them in easily understood terms. The user is never faced with just a core memory dump to debug an error.

## Special Features

**DYNAMO**'s "load & go" feature simplifies running a model. The user does not have to master the vagaries of link-edits and loaders (nor pay for the computer time they require). The order of the equations is the most meaningful to the user. **DYNAMO** reorders automatically for computational purposes.

**DYNAMO** is available for both interactive and batch use.



Company Name : **RAPIDATA, INC.**

Headquarters Address : **20 New Dutch Lane, Fairfield, NJ 07006**

Product Name : **MULTIPLE FUNDING CORPORATION OF AMERICA PROGRAMS**

Number of years commercially available : **9**

Date of last up-date or improvement : **September, 1977**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **Available upon request from MUFU\***

Type(s) of equipment compatible for in-house use : **Honeywell 400s**

Headquarters contact : **Dorothy Monopoli**

Telephone No.: **(201) 227-0035**

### **General Description**

The MUFU programs aid the insurance agent in the sales and calculation of insurance illustrations. The use of these programs simplifies the complex task of meeting a client's insurance objectives while arriving at an acceptable premium cost and method of financing.

The Estate Analysis and Income Planning Program (MUFU 3) performs estate analysis and includes such factors as estate liabilities, federal and state taxes, shrinkage needs, potential liquidity, and available income.

Cost of Waiting (MUFU 6) demonstrates the cost of waiting to an older age to purchase life insurance.

The Ledger Program (MUFU 10) will present whatever information a company requires to describe its policies and their benefits to a client.

Variable Cash Illustrations (MUFU 4) provides various financing techniques for different types of policies. It allows agents to select any two elements of an insurance policy and have the computer determine the third. For instance, face amount and equity could be given and outlay would be calculated by the computer. The kinds of policies available are listed below under special features.

Multiple Policy Analysis (BLENDB), Pension Formula Illustrations (MUFU 7), Keyman Deferred Compensation (MUFU 14), Business Valuation (MUFU 12), and Split Dollar Insurance (MUFU 25) are also offered.

\*Multiple Funding Corporation

### **Special Features**

Special features of the MUFU program include illustrations on:

- Fixed Payment Financed Insurance
- Tax Qualified Financed Insurance
- Separated Tax Qualifications Report
- Retroactive Term Conversion Ledger
- Rated Premium Life Insurance Ledger
- Life Insurance with Term Rider
- Premium Payment Ledger
- Life Insurance Ledger with One Year Term
- Scheduled Face Reduction Ledger
- Automatic Face Reduction Ledger
- Integrated Outside Funding Proposal
- Reinvested Tax Savings Report



Company Name : **RAPIDATA, INC.**

Headquarters Address : **20 New Dutch Lane, Fairfield, NJ 07006**

Product Name : **RAPIDVOICE**

Number of years commercially available : **4**

Date of last up-date or improvement : **Continuous**

Approximate number of current users : **50+**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Dorothy Monopoli**

Telephone No.: **(201) 227-0035**

### General Description

**RAPIDVOICE** is a communication service that transforms a standard telephone into a powerful computer terminal. **RAPIDVOICE** provides the answer to everyday business questions, through remote data entry and inquiry. Users access Rapidata's systems via standard Touch-Tone® telephones or through inexpensive auxiliary pads.

**RAPIDVOICE** combines the ease of "dialing" a phone (to input data) with the flexibility of synthesized "voice" response output, to place the power of Rapidata's network information processing services at any user's fingertips. All verification, editing, file management, and program execution information that is entered via **RAPIDVOICE** can be immediately utilized in conjunction with any Rapidata system or can be sent via **RAPIDLINK** to the customer's in-house system.

**RAPIDVOICE** can "front-end" any application. Transaction data can be transmitted to the in-house system for subsequent processing at any time.

**RAPIDVOICE** applications include cash consolidation, bank balance reporting, budget tracking, order processing, inventory control, sales analysis, credit authorization, quality control, performance measurement and reporting, vehicle tracking or scheduling, and any other data collection or query application.

### Special Features

- Full alpha-numeric data entry
- Unlimited "speaking" vocabulary
- Easily programmed to speak the language of the user's application
- Maintains complete security of data
- Easy to use - requires minimal training
- Reduces data entry error
- Front-ends in-house systems
- Nationwide network coverage



Company Name : **RAPIDATA, INC.**

Headquarters Address : **20 New Dutch Lane, Fairfield, NJ 07006**

Product Name : **RUNOFF\***

Number of years commercially available : **3**

Date of last up-date or improvement : **January, 1977**

Approximate number of current users : **n.a.**

Purchase price if available on in-house equipment : **Provided with Operating System**

Type(s) of equipment compatible for in-house use : **PDP DEC 10s or 11s**

Headquarters contact : **Dorothy Monopoll** Telephone No.: **(201) 227-0035**

## General Description

**RUNOFF is Rapidata's text processor. This easy-to-use program produces finished text suitable for reproduction. It is used to prepare documents that are likely to have revisions.**

**Some typical applications include:**

- **Manufacturing** - **Product, maintenance & procedure manuals**
- **Data Processing** - **Documentation**
- **General Business** - **Proposals, contracts**
- **Engineering** - **Specifications**
- **Utilities** - **Specifications, engineering reports**
- **Insurance** - **Actuarial tasks, procedure manuals**
- **Banks** - **Procedure manuals**
- **Government** - **Reports, studies, catalogs and budgets**

**People likely to use RUNOFF include:**

**Secretaries, Publishers, Engineers, Bankers, Lawyers, Managers, Insurance Actuaries, Government Employees, Programmers.**

**\*product of Digital Equipment Corporation**

## Special Features

- **Upper and Lower Case**
- **Tabulation**
- **Paging**
- **Fill and Justification**
- **Centering**
- **Automatic Indexing for Table of Contents**
- **Chapter and Header Levels within Chapters**
- **Automatic Paragraphing**
- **Capitalization through either Text Entry or Capitalization Flags**

Company Name : **REMOTE COMPUTING CORPORATION**

Headquarters Address : **1076 E. Meadow Circle, Palo Alto, CA 94303**

Product Name : **THE LMS® SYSTEM**

Number of years commercially available : **6**

Date of last up-date or improvement : **August, 1978**

Approximate number of current users : **50**

Purchase price if available on in-house equipment : **:**

Type(s) of equipment compatible for in-house use : **Terminals with dial-up capability**

Headquarters contact : **Philip M. Lumish**

Telephone No.: **(800) 645-3120**

## General Description

The LMS® Liquidity Management System is a full accounting and trading analysis system for fixed income and mortgage backed securities. It provides over 50 reports covering all aspects of accounting, inventory and activity. The system has been fully audited and provides complete audit trail capability. Broker confirmation letters and safe-keeping location reports are also provided. Special analysis reports give investment officers a tool with which they can evaluate trade possibilities.

## Special Features

- Automatic securities pricing based on linking with market file
- Trades analysis
- Swap analysis is for cash flow examination
- Broker confirmation letters
- Accounting for Repo's, Pledges, Borrowings and Reverse Repo's
- Inventory on the basis of maturity
- Full data display
- Accounting updating five days prior to month end
- Reports on the terminal or printed off-line
- Full mortgage back security accounting
- GNMA's linked to pool factors

(415) 494-6111

Date: **November, 1978**

Submitted By: **Philip M. Lumish, Nat'l Sales Manager**



Company Name : REMOTE COMPUTING CORPORATION

Headquarters Address : 1076 E. Meadow Circle, Palo Alto, CA 94303

Product Name : MERLIN

Number of years commercially available : 9

Date of last up-date or improvement : March, 1978

Approximate number of current users : 60

Purchase price if available on in-house  
equipment :

Type(s) of equipment compatible for  
in-house use : Terminals with dial-up capability

Headquarters contact : Phillip M. Lumish

Telephone No.: (800) 645-3120

### General Description

The MERLIN data base contains fundamental and technical data on over 11,000 securities, options and commodities with over 100 market indexes, averages and statistics compiled at least on a weekly basis. The information contained within the MERLIN data base can be used to monitor particular markets, use various mathematical modeling techniques, create charts and graphs, and provide for portfolio accounting. Either the customer or RCC can create special programs or data bases to handle specific needs.

### Special Features

- Only system with securities, options and commodities
- History going back 12 years
- Largest collection of time-share data on commodity futures contracts
- Custom programming
- Graphics on hard copy, video and plotter terminals
- Consultants available in theory and operation of mathematical models



Company Name : **REMOTE COMPUTING CORPORATION**  
Headquarters Address : **1076 E. Meadow Circle Palo Alto, CA 94303**

Product Name : **MSB/SLP**  
Number of years commercially available : **10**  
Date of last up-date or improvement : **July, 1978**  
Approximate number of current users : **100**  
Purchase price if available on in-house equipment :  
Type(s) of equipment compatible for in-house use : **Terminals with dial-up capability**  
Headquarters contact : **Philip M. Lumish** Telephone No.: **(800) 645-3120**

## General Description

The MSB/SLP financial planning systems provide thrift industry management a tool with which they can forecast their growth from one year through ten years into the future. These forecasts result in a series of reports showing balance sheet, income statement, cash flow, tax, investment, loan and savings information. In addition, reports can be generated to show budget information compared to actual data and the differences in dollars and per cents between the two.

## Special Features

- Customization of reports
- Ability to examine calculations
- Five different ways to allocate excess cash
- "What-if" assumptions made on the terminal with new results immediately seen
- Ability to do both monthly and annual runs
- Month-to-month availability
- Variance and comparison reporting

Company Name : REMOTE COMPUTING CORPORATION

Headquarters Address : 1076 E. Meadow Circle, Palo Alto, CA 94303

Product Name : RCR

Number of years commercially available : 3

Date of last up-date or improvement : July, 1977

Approximate number of current users : 8

Purchase price if available on in-house  
equipment :

Type(s) of equipment compatible for  
in-house use : Terminals with dial-up capability

Headquarters contact : Philip M. Lumish

Telephone No.: (800) 645-3120

### General Description

The RCR (Responsibility Center Reporting) system has been created to assist all thrift institutions with their detailed budgeting process. RCR permits entry of 200 income and expense items for each cost center within the organization. Because of the file structure used, corrections to initial budgets can be easily entered with the resulting printouts immediately available for review. By entering actual results by cost center, a series of variance reports can be run to show dollar and percentage differences between actual results and budget estimates.

### Special Features

- Multi-level reporting
- Variance reporting
- Simple operation allows easy connection
- Customized headings
- Various time periods

Company Name : **SCIENTIFIC TIME SHARING CORPORATION**

Headquarters Address : **7316 Wisconsin Ave., Bethesda, MD 20014**

Product Name : **FULLTEXT**

Number of years commercially available : **6**

Date of last up-date or improvement : **February, 1978**

Approximate number of current users : **40**

Purchase price if available on in-house equipment : **Price Upon Request**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Allen J. Rose**

Telephone No.: **(914) 428-6910**

## General Description

**FULLTEXT** is an interactive user-oriented system for storage, search, and retrieval of natural language text. Conceptually, documents consist of free-form text which can be searched for the occurrence of single words, any set of words or consecutive words, or phrases. In addition, commands are provided to combine the result of such searches through the use of commands such as "and," "or," and "and not" in order to quickly narrow down on a set of documents meeting the desired criteria.

## Special Features

A variety of search, retrieval, and maintenance functions are provided to enable users to store and recall information conveniently, including functions to:

- file, replace, or erase documents
- classify words as insignificant or significant
- search for words or phrases
- combine searches
- print the entire text of a document
- print the first or last line of a document.

Company Name : **SCIENTIFIC TIME SHARING CORPORATION**

Headquarters Address : **7316 Wisconsin Ave., Bethesda, MD 20014**

Product Name : **READABILITY ANALYSIS**

Number of years commercially available : **5**

Date of last up-date or improvement : **August, 1977**

Approximate number of current users : **100**

Purchase price if available on in-house equipment : **Price Upon Request**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Howard Bryks**

Telephone No.: **(212) 751-9305**

## General Description

**READABILITY ANALYSIS** interactively rates typed-in text with the Flesch and Fry readability scales. The programs judge the difficulty of text on the basis of the average number of words in a sentence and the average number of syllables per word.

These programs are useful for analyzing the reading ease of insurance policies, consumer contracts, textbooks, advertising copy and instruction manuals.

## Special Features

- Summary scores as well as individual paragraph scoring.
- Proper handling of numbers, abbreviations and jargon.
- Educational grade level included with raw scores.





Company Name : **SYSTEM AUTOMATION CORPORATION**

Headquarters Address : **8555 Sixteenth Street, Silver Spring, MD 20910**

Product Name : **FINANCIAL MANAGEMENT SYSTEM**

Number of years commercially available : **1**

Date of last up-date or improvement : **September, 1978**

Approximate number of current users : **3**

Purchase price if available on in-house equipment : **\$12,000**

Type(s) of equipment compatible for in-house use : **Hewlett Packard 1000/3000**

Headquarters contact : **Harvey Kramer** Telephone No.: **(301) 565-9400**

### **General Description**

The Financial Management System is a series of application packages that can operate either as a highly integrated system or as stand-alone individual applications.

The concept of common modules allows the operator to update and review fields through the CRT. One example of this is the mnemonic access of Master records. By knowing a company or product name, the operator can rapidly construct the mnemonics to retrieve the item. Time consuming references to customer, supplies, and product are unnecessary.

There are four basic processing modules within the Financial Management System - Accounts Receivable, Accounts Payable, Payroll and General Ledger.

- **ACCOUNTS RECEIVABLE** - The Accounts Receivable Module is supported by two basic entity classes; Customer Master and Open Items. The Customer Master entity holds all static information about a customer, including name and address, credit limitation, customer type, etc. The Open Item entity holds all billing and payment information associated with an invoice.
- **ACCOUNTS PAYABLE** - The Accounts Payable Module is supported by two entity classes: Supplier/Master and Accounts Payable. The Supplier Master entity holds all static information about a vendor, including name and address, discount schedule, supplier type, etc. The Accounts Payable entity holds data from Supplier invoices for subsequent payment.
- **GENERAL LEDGER** - The General Ledger Module consists of Journal Entries, Trial Balance Detail Listing, and Trial Balance.
- **PAYROLL** - The Payroll Module is designed to provide Pay Computations and Labor Distribution.

### **Special Features**

- **GENERAL LEDGER** - Handles full range of general ledger accounting needs. Prints financial statements, credit and debit accounts and automatically closes out books at the end of the year.
- **ACCOUNTS PAYABLE** - Selects invoices for payment, writes checks, identifies available discounts and provides comprehensive monthly listings of all disbursements.
- **ACCOUNTS RECEIVABLE** - Selects statements for billing, prints bills and accumulates a general ledger distribution list.



Company Name : **WARNER COMPUTER SYSTEMS, INC.**

Headquarters Address : **605 Third Avenue, New York, NY 10016**

Product Name : **AUTOMOBILE INSURANCE PLAN SYSTEM (AIPS)**

Number of years commercially available : **2**

Date of last up-date or improvement : **On Going**

Approximate number of current users : **8**

Purchase price if available on in-house equipment : **n.a.**

Type(s) of equipment compatible for in-house use : **n.a.**

Headquarters contact : **Hellmut Hameyer**

Telephone No.: **(201) 692-9400**

### **General Description**

AIPS is a fully integrated automobile assigned risk insurance processing system. It is designed to write, rate, cancel, endorse and renew assigned risk policies which also manages all internal accounting and prepares statistical breakouts. An automatic billing feature keeps track of cash receipts, disbursements and displacements. AIPS features interactive data entry and inquiry. Since the total data base is maintained on-line, any policy may be immediately retrieved and updated; and any policy may be restored up to the statutory limit. Out-of-sequence endorsements and other exceptional cases are within the capability of the system. Forms and reports are generated overnight. The data base is copied to tape everyday and placed in archival storage. Any transaction entered is saved for a year to facilitate error recovery.

This system is currently available for New York State and New Jersey and a number of additional states will be added.

### **Special Features**

Date: **November, 1978**

Submitted By: **Hellmut Hameyer, Vice President**





<b>ADP Network Services, Inc.*</b> .....	A.020
American Management Systems, Inc. ....	A.030
<b>Avco Computer Services</b> .....	A.040
<b>Boeing Computer Services Company</b> .....	A.050
Bowne Information Systems .....	A.060
<b>CallData Systems, Inc.</b> .....	A.070
Computer Sharing Services, Inc. ....	A.080
Datalogics, Inc. ....	A.090
Data Resources, Inc. ....	A.100
Decisionex, Inc. ....	A.110
Execucom Systems Corporation .....	A.120
<b>General Electric Information Services Company</b> .....	A.130
<b>Honeywell DATANETWORK</b> .....	A.140
Infonet Division of Computer Sciences Corporation (CSC) ....	A.150
<b>Informatics Inc., Data Services Division</b> .....	A.160
Information Systems Design, Inc. ....	A.170
<b>Insko Systems Corporation</b> .....	A.180
Interactive Data Corporation .....	A.190
Interactive Market Systems, Inc. ....	A.200
<b>I.P. Sharp Associates Limited</b> .....	A.210
Landart Systems Inc. ....	A.220
Manufacturing Data Systems Incorporated .....	A.230
Martin Marietta Data Systems .....	A.240
MCAUTO (McDonnell Douglas Automation Company) .....	A.250
Mellonics Information Center - Litton Systems Inc. ....	A.260
<b>Metrocom Inc.</b> .....	A.270
MRI Systems Corporation .....	A.280
Multiple Access Computer Group .....	A.290
<b>National Computer Network of Chicago, Inc.</b> .....	A.300
National CSS, Inc. ....	A.310
<b>On-Line Systems, Inc.</b> .....	A.320
Polycorn Systems Limited .....	A.330
Proprietary Computer Systems, Inc. ....	A.340
Pryor Corporation .....	A.350
<b>Rapidata, Inc.</b> .....	A.360
Remote Computing Corporation .....	A.370
Ross Systems, Inc. ....	A.380
<b>Scientific Time Sharing Corporation</b> .....	A.390
<b>SDC Search Service</b> .....	A.400
Service Bureau Company, The .....	A.410
Standard & Poor's Fixed Income Systems .....	A.420
Structural Dynamics Research Corporation .....	A.430
Tektronix, Inc. ....	A.440
<b>Telenet Communications Corporation</b> .....	A.450
Uni-Coll Corporation, The .....	A.460
<b>United Computing Systems, Inc.</b> .....	A.470
<b>University Computing Company</b> .....	A.480
<b>Warner Computer Systems, Inc.</b> .....	A.490

\*Companies shown in **bold print** are Corporate Associate Members of ATSU.



Company Name : **AVCO COMPUTER SERVICES**Headquarters Address : **201 Lowell Street  
Wilmington, MA 01887**Telephone No.: **(617) 729-7700****Corporate Description:**

Founded in 1958, Avco Computer Services is an operating unit of Avco Corporation using large scale IBM equipment for Time-Sharing and Remote Batch Processing. Telenet subscriber. Information International FR80 Graphic Recorder for hardcopy and film output.

Approximate Number of Employees: **100**Approximate Number of Users : **1,100****Corporate Officers:**

<b>Richard E. Bibaud</b>	<b>Director</b>
<b>Edwin A. Mercer, Jr.</b>	<b>Marketing Manager</b>
<b>Gene P. Cort</b>	<b>Director - Technical Operations</b>
<b>Charles W. Hewitt</b>	<b>Mgr. - Applications Systems Dept.</b>
<b>Harold Witzer</b>	<b>Mgr. - Computer Operations</b>
<b>George Hodgkins</b>	<b>Mgr. - Accounting</b>

**Areas of Specialization**

Avco Computer Services provides Time-Sharing services via IBM's Time-Sharing Option (TSO). Avco utilizes Telenet for Time-Sharing telecommunications. Avco fully supports 3270's.

Remote Batch Processing is supported via nationwide inbound WATS operating at 4800 BAUD. Local dial up access and leased line service is also supported.

A wide range of applications software is available including PANVALET - A Program Management and Security System, MARK IV - A file Management System, DISSPLA - A Graphics Software Package, SIMPLAN - A Financial Planning and Budgeting System, IMS, GPSS, BMDP, Calcomp Routines and Tektronix Software. Also available is MSC/NASTRAN, ADLPIPE, PMSIV and SPSS.

All IBM compilers and utilities are available for client use.

Available under TSO is VS/Basic, Cobol, and Fortran. Also available under TSO is Cobol Interactive Debug and Fortran Interactive Debug.

**Security Precautions (Facilities, User Data, System Access)**

Avco Computer Services is located in a secured facility employing 24 hour per day armed security guards. Access to the facility is available only on the basis of need. In addition, access to the computer room itself is on a need basis only which is granted to Avco personnel and authorized vendor personnel.

Fire protection is accomplished by an under floor and overhead Halon System as well as Fire Control Monitors located in the main security office.

File backup is stored in a secured and fire resistant off site facility.

Various levels of data security and system access are available. Further information will be furnished upon request.

Date: **July, 1979**Submitted By: **Edwin A. Mercer, Jr., Marketing Manager**

Company Name : **BOEING COMPUTER SERVICES COMPANY**

Headquarters Address : **177 Madison Avenue  
Morristown, N. J. 07960**

Telephone No.: **(201) 540-7700**

**Corporate Description:**

**Boeing Computer Services Company, a division of The Boeing Company, was established in 1970. BCS serves the business, government and data processing communities in the areas of time-sharing, consulting, training, custom programming and related services.**

Approximate Number of Employees: **4,900**

Approximate Number of Users : **2,500**

**Corporate Officers:**

<b>R.W. Tharrington</b>	<b>Pres. &amp; Chief Exec.</b>
<b>B. Wheat</b>	<b>Sr. Vice President</b>
<b>D.W. Judy</b>	<b>V.P. - Asst. to President</b>
<b>R. Henderson</b>	<b>V.P. - Mkt. Res. &amp; Dev.</b>
<b>R. Koval</b>	<b>V.P. - Sales</b>
<b>A.W. Sauerbrey</b>	<b>V.P. - Finan. &amp; Treas.</b>
<b>P.T. Smith</b>	<b>V.P. - Bus. Dev. &amp; Cont.</b>
<b>M.E. Stone</b>	<b>V.P. - Operations</b>

## Areas of Specialization

**MAINSTREAM®-EKS--INTERACTIVE/REMOTE BATCH** is offered throughout the United States, Western Canada and Alaska, via the BCS network. **MAINSTREAM-EKS** offers large scale Cyber 175 users simultaneous interactive and remote batch access to common files, through a multi-mainframe computing entity. Available software includes a highly enhanced version of the Control Data NOS 2.1 operating system as well as FORTRAN (3 compilers), COBOL, BASIC, APL and proven applications programs throughout a wide variety of Engineering, Scientific and Financial disciplines.

**MAINSTREAM-TSO--**is a remote job entry (RJE) system offering multiple turnaround selections and an Interactive processor. A conversational TSO editor and WYLBUR are available. BCS enhanced TSO runs on an IBM 3033 under the control of MVS, and is offered throughout the continental United States, Western Canada, Alaska, and part of Great Britain via BCSNET. A substantial number of data base capabilities are provided, as are Financial, Engineering and Statistical applications.

**MAINSTREAM-CTS--**is an advanced conversational terminal service designed to provide interactive and batch processing via the BCS network. CTS runs on an IBM 3033 under the control of a BCS enhanced version of the VM/370 operating system. This service provides a comprehensive editor, popular programming languages and an application program library supporting both scientific and business applications. This vehicle is also used to deliver **MAINSTREAM-APL (A Programming Language)**. In this way the APL user can have access to other languages, data files created by programs written in other languages, and can call subroutines written in FORTRAN or Assembler Languages. **MAINSTREAM-CTS** is offered in the same geographical areas as **MAINSTREAM-TSO**.

## Security Precautions (Facilities, User Data, System Access)

**MAINSTREAM-CTS** service is provided from a new facility specifically designed to house a modern data center which allows for physical security precautions to be enforced. The facility is equipped with an uninterruptable power supply and diesel generators as an auxiliary power source. Access to the system and to user stored data (in read-only or read/write mode) is controlled by user specified and user modified passwords. Optionally, data files can be scrambled through the use of a KEY operand. On-line data files are backed-up each evening by writing files to tape. These tapes are retained up to six months and certain back-ups are stored off-site as an additional precaution.

**MAINSTREAM-EKS** affords security for users on three levels: Physical security, user ID security and file security. At the physical level the data center includes limited access facilities including armed guards, cypher locks, cleared personnel, etc. all of which are in accordance with DOD secret regulations. At the user ID level, the user is capable of regulating access to the computer by the utilization of password procedures. At the file level users may specify passwords and explicit permissions for file access which include read, write, modify and execute capabilities. Additional file security is provided at the file level by the use of a utility which can place files in an encrypted or decrypted state.

**MAINSTREAM-TSO** is delivered from the same data center as is **MAINSTREAM-CTS** and provides the same physical security precautions. System access is granted only after the user has successfully provided the sign-on password. Data sets can optionally be password protected. Both sign-on and data set passwords are under user control. On-line data sets are backed-up to tape on a daily basis.





**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.060

Company Name : **BOWNE INFORMATION SYSTEMS**

Headquarters Address : **160 Water Street  
New York, NY 10038**

Telephone No.: **(212) 952-4400**

**Corporate Description:**

**Organized in 1969, BIS is a wholly-owned subsidiary of Bowne & Co., Inc. The nation's oldest and largest printer. BIS operates regional offices in Atlanta, Boston, Chicago, Houston, Los Angeles, New York, Philadelphia, Washington D.C. and San Francisco.**

Approximate Number of Employees: **225**

Approximate Number of Users : **4000**

**Corporate Officers:**

<b>Dale Ries</b>	<b>President</b>
<b>William Mahony</b>	<b>V.P. - Sales</b>
<b>Dave Herr</b>	<b>V.P. - Development</b>
<b>Ted Heiweg</b>	<b>V.P. - Cyberway</b>
<b>Benjamin Mathews</b>	<b>V.P. - Finance</b>

### **Areas of Specialization**

**Specialized text processing services offered through the "Bowne Connection" — linking a remote word processor or terminal directly to the BIS text software packages:**

- **Word/One interactive text processing for document preparation**
- **PhotoComp computer photocomposition**
- **Mailpac correspondence management for list maintenance, personalized letter production, electronic message transmission in such areas as consumer correspondence, internal correspondence, trade notification. Response tracking and management report generation.**
- **KeySearch information search & retrieval. For record and file management as in litigation support and nuclear records management.**
- **COMSPEC interactive text editing for specification preparation. And access to special data bases on construction text.**

### **Security Precautions (Facilities, User Data, System Access)**

**NOTE: BIS text systems are also available as a program product for installation on in-house IBM 360/370 systems.**

**Any of the BIS software packages listed above can be utilized in start-up and turnkey projects through Bowne's Cyberway Services Division. Cyberway can implement a Bowne application package on interim basis.**

**SECURITY: A security screen of sufficient size is used to mask the system sign-on information. The sign-on information is three levels — account number, user number and password. The operator has the option of changing the base on a system-generated random 5 digit number which is available. In addition, the system provides document security such that a user outside the customer's account can access the customer's information only under the direction of that customer. Physical access to BIS computer facilities are restricted to BIS operation employees. Security identification is required.**

Date: **July, 1979**

Submitted By: **Richard M. Leonard, Director - Public Relations**



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.070

Company Name : **CALLDATA SYSTEMS, INC., Subsidiary of Grumman Data Systems Corporation**

Headquarters Address : **20 Crossways Park North  
Woodbury, N.Y. 11797**

Telephone No.: **(516) 575-5650**

**Corporate Description:**

**CallData Systems, Inc. was formed in July 1975 as a wholly-owned commercial subsidiary of Grumman Data Systems Corporation, to consolidate its commercial computer services activities. GDSC was founded by the Grumman Corp. in 1970.**

Approximate Number of Employees: **250**

Approximate Number of Users : **1,000**

**Corporate Officers:**

<b>Robert A. Nafis</b>	<b>Chairman of the Board</b>
<b>Edward Ballnsky</b>	<b>President</b>
<b>D. Curtis DeForest</b>	<b>V.P. - Business Development</b>
<b>Edward Somol</b>	<b>V.P. - Operations</b>
<b>Thomas C. McKessey</b>	<b>Treasurer</b>
<b>Robert W. Bradshaw</b>	<b>Secretary</b>

### **Areas of Specialization**

**CallData provides five personalized computer services:**

- **TS\*RJE™/Time-sharing - AMDAHL 470 VM/CMS**
- **TS\*RJE™/Batch - AMDAHL 470 VS**
- **EASY\*USE™(DTSS) Time-sharing - Honeywell 66/07**
- **CompUtility™ Time-sharing - Triple DEC System 10**
- **TeleScope™/Remote-Computing - CDC Cyber/73/172**

**and five major software libraries (over 1,000 programs) plus selected applications for: Accounting, Aviation, Banking, Data Base Management, Economics, Education, Engineering, Finance, Graphics, Government, Law, Management, Mathematics, Marketing, Merchandising, Programmer Aids, Simulation, Security, Transportation, Word Processing.**

### **Security Precautions (Facilities, User Data, System Access)**

**The CallData Security Program uses modern access control and detection devices to protect the information and equipment vital to both customers and CallData.**

**Visitors to the Data Center are escorted at all times. Access is by means of identification badge. Further identification is necessary for access to the computer rooms. After normal working hours, all entrance and exit doors are alarmed and a watchlock patrol is active.**

**Vital information is stored in brick and concrete copper shielded vaults with four-hour fire doors. In addition, vital tapes may be duplicated and stored in a similarly constructed off-site vault. The computer rooms have an under-floor CO2 fire control system controlled by a Pyr-A-Larm ionization detection system. Remote access terminals are protected by specially designed hardware and software safeguards. Data scramblers may be attached at the terminal ends for further protection of highly proprietary leased line circuits.**

Date: **July, 1979**

Submitted By: **D. Curtis DeForest, Vice President**

*Bill Nass*



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.080

Company Name : **COMPUTER SHARING SERVICES, INC.**

Headquarters Address : **2498 West Second Avenue  
Denver, CO 80223**

Telephone No.: **(303) 934-2381**

**Corporate Description:**

**Computer Sharing Services was founded in 1967 as a wholly-owned subsidiary of Rio Grande Industries, Inc. We have been dedicated to providing quality time-sharing services and support since our inception.**

Approximate Number of Employees: **n.a.**

Approximate Number of Users : **n.a.**

**Corporate Officers:**

<b>J. A. Alkema</b>	<b>President</b>
<b>D. Walkovitz</b>	<b>V.P. - Marketing</b>
<b>Robert Wegsten</b>	<b>V.P. - Technical Services</b>
<b>P. L. Wise</b>	<b>V.P.</b>
<b>David A. Schneider</b>	<b>Controller &amp; Treasurer</b>
<b>C. E. Schmeckpeper</b>	<b>Secretary</b>

### **Areas of Specialization**

**Computer Sharing Services (CSS) offers complete time sharing service, plus personalized service for all our customers.**

**Interactive time sharing, remote batch, and remote job entry are available via our international network.**

**A large applications library is available to all users. CSS is especially strong in the areas of:**

- **Financial Planning, Reporting, and Forecasting**
- **Corporate Modeling with EMPIRE**
- **Comprehensive, Integrated Systems for Bond Underwriters**
- **Mining Applications, including Remote Sensing**
- **Illumination Engineering and Lighting Design**

**Dartmouth Time Sharing System (DTSS) is the operating software for our Honeywell 6600 Series hardware.**

### **Security Precautions (Facilities, User Data, System Access)**

**FACILITIES** - The CSS Computer Center is staffed around the clock every day of the year. Access to both the building and the computer room is controlled by several sets of locked doors. The computer is protected from power fluctuations and outages by a motor generator. Many precautions have been taken to guard against fire and water damage, including sensors and alarm systems.

**USER DATA** - User data may be protected at a variety of levels. Passwords may be placed on files by the user. Access to files may be restricted further if the user withholds access permissions (read, write, append, list, etc.). Files may be stored in a form that is non-listable or unintelligible to others: random, binary, encoded, or compiled. CSS protects user data with daily backup tapes which are stored in an off-site tape vault.

**SYSTEM ACCESS** - System access is controlled by the use of validated user numbers and passwords which may be changed at the user's request. Each user number is unique to the system. Access may be limited to a particular terminal through the assignment of an answerback.

Date: **July, 1979**

Submitted By: **Patricia A. Lang, Manager - Image Creation**



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.090

Company Name : **DATALOGICS, INC.**

Headquarters Address : **University Circle Research Center  
11001 Cedar Avenue, Cleveland, OH 44106**

Telephone No.: **(216) 229-1300**

**Corporate Description:**

Private, full capabilities, remote computer services company since 1969. Heavy concentration in Northeast Ohio area, but offer services through affiliates in Chicago, Philadelphia, and New York City. Commercial network services elsewhere.

Approximate Number of Employees: **75**

Approximate Number of Users : **1000**

**Corporate Officers:**

<b>Benson P. Lee</b>	<b>President</b>
<b>David G. Shields</b>	<b>Exec. V.P.</b>
<b>Thomas J. Madden</b>	<b>Director of Marketing</b>

### **Areas of Specialization**

**SERVICES** - Complete services including design, programming, training, implementation, data conversion, data entry, operation, control and support.

**PACKAGES** - CODASYL standard Data Base Management System; Interactive Graphics package; Financial Modeling and Analysis; Statistical Library including SPSS; APL Business Library; Integrated Accounting package including General Ledger, Accounts Receivable, Accounts Payable and Fixed Assets; College and University Accounting services; Medical Billing and Insurance Reporting.

**ACCESS MODES** - Time-sharing, Remote Batch, CRJE, Local Batch, Transaction Processing.

**CONTRACTS** - Resource rates, bulk use agreements, standard and "governed" ports and fixed price long term agreements.

### **Security Precautions (Facilities, User Data, System Access)**

**FACILITIES** - 24-hour security force. Equipment is operator attended during operating periods. Authorized access only to locked computer and communications rooms. Escorted access only in offices. Off-site storage facilities.

**USER DATA** - Incremental back-up twice daily. Complete back-up daily. End-of-day back-up saved for current week. End-of-week back-up saved for current month. End-of-month back-up saved for current quarter. End-of-quarter back-up saved for current year. All back-up stored off premises. User may journalize to tape or "private pack" for immediate back-up. Access to user data controlled by user through access permission privileges and passwords. User may encipher data bases through cipher key control.

**SYSTEM ACCESS** - Normal user number account name and password control. User or administrator may change password. Provisions for project identification. Creation of new accounts requires independent authorization procedures. Automatic time-out and operator notification on attempted unauthorized access.

Date: **July, 1979**

Submitted By: **Thomas J. Madden, Director of Marketing**



Company Name : **DATA RESOURCES, INCORPORATED**

Headquarters Address : **29 Hartwell Avenue  
Lexington, MA 02173**

Telephone No.: **(617) 861-0165**

**Corporate Description:**

**DRI combines on-line access to worldwide economic forecasts, data banks, models and software with management & technical consulting, educational programs and contract research to meet the particular needs of each customer. DRI provides full language capabilities for timesharing on two Burroughs 7700s.**

Approximate Number of Employees: **Over 600**

Approximate Number of Users : **Over 2000**

**Corporate Officers:**

<b>Otto Eckstein</b>	<b>President</b>
<b>Edward Green</b>	<b>Vice President</b>
<b>John Lauer</b>	<b>Vice President</b>
<b>Donald McLagan</b>	<b>Sr. Vice President</b>
<b>Dennis O'Brien</b>	<b>Sr. Vice President</b>
<b>Edward Siegfried</b>	<b>Sr. Vice President</b>

**Areas of Specialization**

**CORPORATE PLANNING**

- Forecasts product line demands
- Develops budget and control models
- Links corporate cash flows
- Models the effects of investments

**REGIONAL ANALYSIS**

- Models relationships of employment, housing, income, retail sales, etc.
- Forecasts changes in regional conditions

**INVESTMENT ANALYSIS AND DECISIONS**

- Inter-industry check on estimate consistency
- Forecasts relative industry profitability
- Identifies new industry profit opportunities
- Models individual company sales and profits

**SUPPORT FOR ECONOMIC RESEARCH CENTERS**

- Accurate on-line data
- Model building and simulation
- Training of researchers and students

**BANKING**

- Industry-by-industry cash flows, profit
- Forecasts loans, deposits, other cash flows
- Models real estate and direct investments

**FINANCE**

- Company modeling, analysis, and reporting
- Industry models and input/output relationships
- Security, money and credit data analysis

**INSURANCE**

- Forecasts growth, costs and profitability
- Demand potential for commercial insurance
- Forecasts policy loan demand
- Models real estate and direct investments

**MARKETING**

- Checks sales forecasts and performance
- Projects long-term prospects for product lines
- Analyzes special effects of advertising

**Security Precautions (Facilities, User Data, System Access)**

**FACILITIES**

- Facility is manned 24 hours per day, 7 days per week
- Computer facility has restricted access
- Facility is completely fire proof

**USER DATA**

- On-line user data is backed up daily on tape and stored
- Access to user data is restricted to the owning user through a series of guardfiles
- A hashing facility is available for users to encode their data

**SYSTEM ACCESS**

- System access is via an international network, restricted to valid usercodes and passwords. Passwords may be changed at the user's discretion.

Company Name : **DECISIONEX, INC.**

Headquarters Address : **1200 Post Road East  
Westport, CT 06880**

Telephone No.: **(203) 226-7424**

**Corporate Description:**

**Decisionex, inc. was organized in 1971 to develop computer software for financial applications. The firm is privately held.**

**Corporate Officers:**

**Herbert Terry  
Herbert Herman**

**President  
Vice President**

Approximate Number of Employees: **6**

Approximate Number of Users : **100**

## Areas of Specialization

**FINANCIAL MODELING FOR:**

- **Real Estate Investment and Appraisal**
- **Corporate Return on Investment**
- **General Cash Flow Analysis**
- **Merger and Acquisition Analysis**

**SPECIALIZED CAPABILITIES FOR:**

- **Real Estate Developers, Investors and Consultants**
- **Shopping Center and Office Building Management**
- **Insurance Companies**
- **Accounting Firms**
- **Banks**
- **Pension Funds**
- **Urban Development Authorities**
- **Retail Chains**
- **Other Financially Oriented Institutions**

## Security Precautions (Facilities, User Data, System Access)

**FACILITIES** - Computer utilized is Burroughs B6700 located at the Burroughs New York City data center. Burroughs corporate security precautions are enforced.

**USER DATA AND SYSTEM ACCESS** - User codes are initially assigned as requested by user. Access to system and to files is by valid user code and password combination. Password can be changed by user on-line. Access to files can be restricted or shared wholly or in part, as specified.



Company Name : EXECUCOM SYSTEMS CORPORATION

Telex No.: 776497

Headquarters Address : P.O. Box 9758  
Austin, TX 78766

Telephone No.: (512) 345-6560

**Corporate Description:**

EXECUCOM is a privately held corporation, founded in 1974 by Dr. G.R. Wagner, to specialize in planning technology, research, development, consulting and training. EXECUCOM INTERNATIONAL is a wholly-owned subsidiary, formed in 1978, to further EXECUCOM's goals in the international market.

Approximate Number of Employees: 65

Approximate Number of Users : 3,000, 250 organizations

**Corporate Officers:**

**EXECUCOM SYSTEMS CORPORATION**

Dr. G.R. Wagner	President
R.W. Cilkeman	Executive Vice President
J.R. DeLine	Vice President
H.A. Relistab	Vice President

**EXECUCOM INTERNATIONAL**

T.H. Braun	President
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## Areas of Specialization

**PLANNING LANGUAGES:** EXECUCOM markets the Interactive Financial Planning System (IFPS)<sup>TM</sup>. IFPS is being improved in function and performance continuously. Current R&D efforts will continue this trend in the areas of modeling and data base.

**PLANNING LABORATORY:** In March, 1979, EXECUCOM will make available to its clients a completely appointed PLANNING LABORATORY<sup>TM1</sup> in Austin, Texas. This facility will provide access to IFPS and the JUDGMENT VISUALIZOR<sup>TM2</sup> by way of sophisticated multi-media displays.

**CONSULTING SERVICES:** Senior EXECUCOM consultants are available in all areas of planning. Financial simulation, econometric analysis, mathematical programming, data base design, and total planning systems require detailed design, extensive analysis, and successful implementation. EXECUCOM is a recognized leader in these fields.

**TRAINING:** EXECUCOM conducts training seminars for executives at all levels. Seminars are tailored for specific organizations or offered in public versions. Courses in IFPS and other planning techniques are held in Austin and in client offices.

**PLANNERS LEAGUE<sup>TM3</sup>:** EXECUCOM sponsors a league of planning professionals who meet to participate in seminars and workshops. The League controls the frequency, place, and content of offerings. In addition, similar activities are held for executives who would benefit by using similar technology but are strictly in corporate planning.

## Security Precautions (Facilities, User Data, System Access)

<sup>TM1</sup>, <sup>TM2</sup>, <sup>TM3</sup> Trademark applied for.

Date: July, 1979

Submitted By: EXECUCOM Systems Corporation



Company Name : **GENERAL ELECTRIC INFORMATION SERVICES COMPANY**

Headquarters Address : **401 N. Washington Street  
Rockville, MD 20850**

Telephone No.: **(301) 340-4000**

**Corporate Description:**

General Electric Information Services Company is a subsidiary of the General Electric Company, a publicly held corporation. GEISCO, a pioneer in the remote data processing industry, offers an extensive remote information processing service: **MARK III® Service**.

Approximate Number of Employees: **3000+**

Approximate Number of Users : **5000+**

**Corporate Officers:**

<b>D.S. Bates</b>	<b>President</b>
<b>R.R. Hench</b>	<b>V.P. &amp; Gen. Mgr. - Engineering Dept.</b>
<b>R.T. Hobbs</b>	<b>V.P. &amp; Gen. Mgr. - Nat'l Sales Dept.</b>
<b>P.R. Leadley</b>	<b>V.P. &amp; Gen. Mgr. - Int'l Mktg. Dept.</b>
<b>R.W. Marshall</b>	<b>V.P. &amp; Gen. Mgr. - Systems Dept.</b>

## Areas of Specialization

**MARK III Service** consists of five major elements: Interactive, conversational timesharing; Foreground Service; Remote batch processing; Background Service; Single-source distributed data processing for transaction-oriented application; an International remote computing network with local access in over 20 countries; customer support.

**GEISCO MARK III Service** users can access either the interactive Foreground Service or the batch Background Service virtually 24 hours a day from more than 600 metropolitan areas in over 20 countries around the world. Foreground Service supplies users with a full complement of timesharing capabilities. It also acts as a conversational interface to Background Service. Background Service offers users a choice of systems: GCOS Background Service processes data on Honeywell 6000 Series equipment; VS Background Service utilizes IBM System/370 equipment. At the core of the system are mass storage devices linked in cluster arrangements to further facilitate user access to data files and programs and reliability of access. Customers can link in-house computer systems to MARK III Service via high-speed lines or they can use MARK III Service as a completely independent processing capability. Processing equipment is housed in three high-security Supercenter complexes: one in Ohio, one in Maryland, and one in the Netherlands.

**DISTRIBUTED DATA PROCESSING** - General Electric Information Services offers a total DDP system called the **MARKLINK® System**, which is the first system of its kind available from one responsible and accountable source. The **MARKLINK System** is designed for applications with a large number of transactions requiring both local and host processing capabilities. System elements include host computers, an international teleprocessing network, minicomputers with video displays, standard and customized software, and customer support.

## Security Precautions (Facilities, User Data, System Access)

**FACILITIES** - The computer Supercenters are protected from power variances and failures by uninterruptible power supply equipment and a backup set of power generators. Detection devices are installed to detect and prevent all forms of intrusion and drastic environmental changes. Periodic audits constantly evaluate and test all security safeguards.

**USER DATA** - Within the subscription itself, each user can protect individual programs and data files to the level he desires. Features available include file names, file passwords, binary files, encryption (in Foreground), and file locks. A file permission system allows a user to permit other users within the subscription access to files to the extent of read-only, append, write, or execute-only. These permissions can be revoked at any time. Weekly copies of on-line permanent disk files are maintained on backup media both on and off site.

**SYSTEM ACCESS** - Each customer subscription is a separate entity within the MARK III System. User numbers are the most basic access requirement; however, even valid user numbers may be coded to be accepted only from the specific terminals designated to use them. Passwords are established as an integral part of the user number. Subscription control features, frequently used by administrative users within large customer organizations, allow that customer to place limits on the amount of resources consumed by project, person, or dollar amount.

\*Service Mark of General Electric Information Services Company.

Date: **July, 1979**

Submitted By: **Melanie Branon, Marketing Communications Specialist**



Company Name : HONEYWELL DATANETWORK

Headquarters Address : Honeywell Plaza  
Minneapolis, MN 55408

Telephone No.: (612) 870-6000

**Corporate Description:**

**DATANETWORK** is an operating division of Honeywell information systems inc. (HIS) providing commercial processing services since 1968. Honeywell Inc. is publicly held.

Approximate Number of Employees: 250

Approximate Number of Users : 1,500

**Corporate Officers:**

C. W. Spangle

S. G. Jerritts

M. Keilher

W. L. Whittington

President

V.P., General Manager  
Info Services Group

V.P., General Manager  
Marketing and Services  
Director - DNW Services

**Areas of Specialization**

Interactive time-sharing and remote job entry, and remote batch services utilizing:

- Honeywell Series 60, Level 66 and Series 6000 processors and standard GCOS software.
- Honeywell supported languages-BASIC, DATABASIC, COBOL 68 and 74, FORTRAN, ALGOL, JOVIAL, APL, PASCAL
- Honeywell file/database management systems - Indexed Sequential Processing (ISP), Integrated Data Store (IDS, IDSII), Management Data Query System (MDQS), Data Management IV (DMIV)

Honeywell application packages/library routines for:

- Application specific - accounting, numeric control, project control, civil engineering, inventory management, mathematical, statistical, linear programming, etc.
- Industry specific - engineering, scientific, manufacturing, etc.

Nationwide access:

- Interactive access with dedicated network, VAN networks and inwats
- Remote batch access, 2400/4800 BPS, via inwats

Qualified Government Teleprocessing Services supplier.

Customer service hotline.

**Security Precautions (Facilities, User Data, System Access)**

**FACILITIES** - The Honeywell facilities are protected by a 24 hour internal guard service. In addition, limited access card key doors, door sensors and motion detectors are employed at the computer installation. Sensors and under floor halon gas provide facility fire protection. Underground routing is used for local electric and phone services.

**USER DATA** - Logical access protection is provided by user ID/password security and optional catalog/file password and/or file encryption techniques. Physical protection is provided by daily saves retained for 30 days and month end saves retained for four months - Including backup, off site storage. The client may also invoke his own file backup for on or off site storage.

**SYSTEM ACCESS** - Alpha numeric ID and protected field password at sign-on. Optional project verification at sign-on. Catalogs, programs, and files may be client permitted, protected, and passworded.

Date: July, 1979

Submitted By: Henry L. Valo, Manager - Planning



Company Name : **INFONET DIVISION OF COMPUTER SCIENCES CORPORATION (CSC)**

Headquarters Address : **650 N. Sepulveda Blvd.  
El Segundo, CA 90245**

Telephone No.: **(213) 678-0311**

**Corporate Description:**

**CSC is a leader in the development and implementation of computer communications systems tech. INFONET, a division of CSC, is a major remote computing services vendor offering worldwide communications, applications software, and technical support.**

Approximate Number of Employees: **10,000**

Approximate Number of Users : **2,500**

**Corporate Officers:**

**W.R. Hoover  
R. Nutt  
V.R. Grillo, Jr.  
E.D. Grodner  
Dr. A.E. Nashman  
G. Barratt  
J.W. Luke  
J.J. Kramer**

**Chairman & President  
Vice President  
V.P. - Prog. Dev.  
V.P. - Sec., Legal  
Pres., Sys. Group  
V.P. - Finance  
Pres., Data Serv. Group  
Pres., INFONET Div.**

**Areas of Specialization**

**The INFONET Division of CSC provides computing services to government and industry through its operating system called the Computer Sciences Teleprocessing System (CSTS). CSTS offers a range of programming capabilities and applications to support any specialized computational needs. These Includes:**

- **Business and Financial Management, Modeling and Analysis**
- **Data Management, Reporting and Display**
- **Management Sciences and Statistics**
- **Civil, Electrical, Mechanical and Structural Engineering Analysis**
- **Communications Industry Applications**
- **Human Resources Systems**
- **Energy Systems for Oil, Gas, and Coal Producers and Users**

**In addition, INFONET offers customized contract programming to assist clients in meeting their system implementation requirements.**

**Security Precautions (Facilities, User Data, System Access)**

**INFONET employs administrative procedures and specific controls to maintain the integrity of the computer physical facility. Features include:**

- **24-hour uniformed guards provide access control and facility monitoring**
- **Specific coded badges required for entrance to computer areas**
- **Locked and alarmed entrance doors**
- **Fire safety/environmental monitoring systems**
- **Cipher locks/comboination changes**
- **Extensive data control security and validation procedures**
- **Low-profile environment - no windows to allow outside viewing of computer areas**

**User data security and system access controls include the following:**

- **User Identifiers**
- **User-controlled file access**
- **User-controlled passwords**
- **Library sharing protection**
- **Additional optional security features that enable the user to impose a variety of additional protective measures**

Company Name : **INFORMATICS INC., Data Services Division**Headquarters Address : **6 Kingsbridge Road  
Fairfield, NJ**Telephone No.: **(201) 575-9610****Corporate Description:**

Informatics, a subsidiary of The Equitable Life Assurance Society, was founded in 1962. Annual revenues are about 75M. The Data Services Division of Informatics, formed in 1972, offers time-sharing and remote batch services, currently utilizing two IBM 370/158's.

Approximate Number of Employees: **2,300**Approximate Number of Users : **750****Corporate Officers:**

Walter F. Bauer  
Werner Frank  
Francis F. Wagner  
Albert S. Kaplan  
John J. Callanan

Informatics President  
Executive V.P.  
Senior V.P.  
V.P. - Finance  
Data Services Div. -  
V.P. & General Mgr.

**Areas of Specialization**

Informatics Data Services Division has three major areas of specialization. These areas are processing services, data base services and application products.

Informatics offers two time-sharing systems for the commercial user. The first, VM/370 CP/CMS is a proven timesharing product with major enhancements and modifications by Informatics. CMS is an advanced conversational terminal service designed to provide program development services and aids to the user of data processing. Informatics also offers users access to a proprietary time-sharing system, known as EZ. Designed for and by users specifically for the problem solver, EZ has a syntax and command structure that are simplistic in nature and nomenclature. Based upon conventional time-sharing philosophy, EZ allows users to utilize a simple, problem solving tool, while controlling the power and flexibility of a large-scale computer. Informatics provides users with VS2 processing services which are linked to the time-sharing systems, allowing users to utilize the benefits and economies of a batch environment from a low speed terminal. VS2 provides users greater flexibility and capability than previously enjoyed under OS.

Informatics Data Base Services include Mark IV, Model 204, RAMIS II and IMS facilities described in ATSU's Data Base Management Applications Directory. The application products available on the Informatics System are classified into two major categories:

- Financial and Planning Packages including SIMPLAN, INVEST, QUICK, STATPAK, SSP, SPSS and BIOMED.
- Application Support Packages including ABC, Graphics and PREMIS.

**Security Precautions (Facilities, User Data, System Access)**

At Informatics Data Center in Fairfield, New Jersey, the Computer Room is accessed exclusively through a combination-locked door. Employees authorized access to this facility include the operating staff and specified technical personnel. All other accesses are kept locked at all times and only authorized employees are issued keys and ID cards to access a rear keylock-operated door. The entire building is wired for security purposes and monitored by electronic surveillance equipment. Informatics permits the user to establish the level of security that is required to fit his needs. As a standard practice, under VM/370, a user is assigned a userid and a password known only to himself and Informatics. Both of these items must be entered to access the System. The Informatics VS2/370 security system is designed to prevent unauthorized batch jobs from running under VS2 and to prevent authorized jobs from accessing cataloged datasets and/or 3330 disk packs that they are not cleared to access. I/O Control maintains a customer profile for each account authorized to run jobs. At the time a job enters the system, the customer profile for the account number specified on the JOB card is located; if it is not found, the job will be rejected. The password on the JOB card will be compared to the password in the profile. When a job is scheduled for execution, its JCL is analyzed to determine which datasets and/or 3330 packs are to be accessed. The customer profile is checked to be sure that these accesses are authorized. Permanent disk datasets and cataloged tape datasets are distinguished by their "high-level index", that is, the part of the dataset name up to the first period in the name. The customer profile contains the high-level indices of the datasets that the account is authorized to access.

**Company Name :** INFORMATION SYSTEMS DESIGN, INC.**Headquarters Address :** 3205 Coronado Dr.  
Santa Clara, CA 95051**Telephone No.:** (408) 249-8100**Corporate Description:**

Information Systems Design was formed in 1966.  
ISD is a privately held company.

**Approximate Number of Employees:** 150**Approximate Number of Users :** 500**Corporate Officers:**

George T. Steeley, Jr.	President
Gabe Bustamante	V.P. - Operations
R.E. Roth	V.P. - Marketing
E. Baessler	V.P. - Finance
Jay Rouse	V.P. - Prod. Mktg.

**Areas of Specialization**

ISD specialized in providing both responsive time-sharing services and fast turn-around remote-batch services on four Univac 1108's and one Univac 1100/82 running EXEC 8. ISD offers structural engineering, electronic engineering, and data base and graphics applications services.

Structural Engineering packages available at ISD include ANSYS, MARC, and NASTRAN. ISD also offers SPAR, a state of the art, interactive analysis system. SPAR utilizes a data base which includes a complete history of the analysis.

ISD offers a complete set of electronics engineering packages that covers everything from circuit to wire routing. ISD's ASPEC program is a comprehensive interactive circuit simulation program, LOGIS is a logic simulation application.

ISD offers System 2000, MRI's hierarchical data base system along with design and implementation support.

ISD has a complete product line in the Graphics area including Surface Display Library for contouring and DISSPLA, which is a powerful generalized plotting system.

**Security Precautions (Facilities, User Data, System Access)**

**FACILITIES** - ISD's systems are located in a controlled access facility. The facility is protected with fire and intrusion detectors and alarms. The computer is protected with a HALON fire extinguishing system.

**USER DATA** - Each customer may have his files protected to whatever degree desired. Access to files may be controlled at the company level, the division level, or the individual user level; read and write access may be controlled separately. Read or write access keys may be used. Encryption routines are available. Files are backed up to tape daily.

**SYSTEM ACCESS** - To access the system, the user must enter a user ID, a billing identifier, and a password. Each of these is validated. The user may change his password at will.



Company Name : INTERACTIVE MARKET SYSTEMS, INCORPORATED

Headquarters Address : 19 West 44th Street  
New York, NY 10036

Telephone No.: (212) 869-8810

**Corporate Description:**

Approximate Number of Employees: 70  
Approximate Number of Users : 500

**Corporate Officers:**

Leon H. Liebman	Chairman of the Board
Richard F. Makely	President
Jim Harry	Sr. V.P. - Operations
Paul A. Albrecht	Vice President
Edward Lee	V.P. - Marketing Services
Mel Ackerman	V.P. - Prod. Development

## Areas of Specialization

IMS advertising and marketing computer services include:

- SUPER Series - Local market media planning-multimedia, TV Radio and Newspaper
- Telequest - On-line questionnaire processing
- Marketing Analysis & Research System - Cross-Tabulation of syndicated or proprietary data
- Master Optimization - Advertising of optimization of R&F, response, budget
- Step-1 - Advertising campaign schedule constructor
- MODAL - IMS Reach & Frequency System
- AID-Automatic Interaction Detector - Target Identification & market segmentation
- CRANK - Cost ranking & efficiency analysis for media data
- PROMO - Product movement analysis for Nielsen, SAMI and client data
- Interactive Diary Analysis - Analysis for any diary data base
- Stems TV - TV buy post analysis matched to Arbitron/Nielsen
- ALLOCATOR - Network allocation to local market delivery
- Media Imperative/Comparatives - R&F comparisons of mixed media schedules
- BAR Online - Integrates BAR Network with media data
- ADCUME - Weekly audience accumulation and optimization system
- CLUS - Interactive cluster analysis

## Security Precautions (Facilities, User Data, System Access)

Modern physical site control and detection devices protect equipment and both customer and IMS information. Security assures that only authorized personnel and authorized visitors are allowed access to the computer center.

Access to online use data, offline use data and the system is protected by user password.

Back-up tape copies of on-line data are retained both on-site and in an off-site vault.

Date: July, 1979

Submitted By: Daniel Olasln, Director-Planning & Development



Company Name : I.P. SHARP ASSOCIATES LIMITED

Headquarters Address : 145 King Street West  
Toronto, Canada

Telephone No.: (416) 364-5361

**Corporate Description:**

International APL time-sharing and systems consulting corporation with operating subsidiaries in Austria, Australia, Belgium, Canada, Denmark, France Germany, Holland, Scotland, Sweden, Switzerland, United Kingdom and U.S.A. 43 Branch Offices.

Approximate Number of Employees: 350

Approximate Number of Users : 2,500

**Corporate Officers:**

I.P. Sharp  
R.D. Moore  
E.A. McDorman  
B.R. Hockey

President  
Vice President  
Vice President  
Treasurer

**Areas of Specialization**

I.P. Sharp Associates offers the industry standard "SHARP APL" and systems consulting with specialized services in:

- Data Bases in areas such as airlines, banking, corporations, demography, economics, energy, environment, insurance and securities.
- Packages and consulting in Econometric and Statistical Analysis; Materials Management; Planning and Control; Financial and Actuarial Analysis; and Financial Consolidation.
- Contract APL programming and design.
- Special Systems (mini and micro-computers) consulting including: feasibility studies, system design and specification, programming, testing, and systems management.
- Education in APL.
- Sharp APL time-sharing is available on a local dial-up basis in over 260 cities in North America, Europe and Australia.

**Security Precautions (Facilities, User Data, System Access)**

Physical and logical security is audited regularly by the appropriate governmental security agencies.

**FACILITIES** - Machine site in modern office building. Security guards at entrance. Complete configuration redundancy. Power failures virtually unknown. Proprietary packet-switching facility reduces perceived line hits by 50%. SHARP APL tasks may be run independent of terminals (NTASK or BTASK.)

**USER DATA** - Dispersal Control: Account number password, workspace lock, file access matrices all changeable directly by owner. Functions (algorithms) may be locked (inhibit display) permanently. Sophisticated auxiliary mechanisms are available for time-window, specified account, access inhibition and tracking. Recovery from Data loss: Copies of all client information are stored to tape daily for retention at off-site vault. Information may be restored as of a given day. Weekend back-ups are retained 13 weeks. Month-end back ups are retained for at least 4 years. On system crash, workspaces are recovered as of not more than 4 seconds prior to crash, and files are intact as of last file operation request.





Company Name : **LANDART SYSTEMS INC.**

Headquarters Address : **135 William Street  
New York, NY 10038**

Telephone No.: **(212) 962-7781**

**Corporate Description:**

**Landart Systems Inc., founded in 1973, is a wholly owned subsidiary of Carroll McEntee & McGinley Incorporated.**

Approximate Number of Employees: **20**

Approximate Number of Users : **50**

**Corporate Officers:**

**John Gilmour  
Ralph Shea**

**President  
Vice President**

**Areas of Specialization**

**Landart Systems Inc. offers all the capabilities of its DECSYSTEM-20 under the Tops-20 operating System to provide cost effective time-sharing and batch services. In addition to the standard compilers and utilities, Landart Systems Inc. has available:**

- **Data Base Management System - System 1022™**

**This is a comprehensive data base management system developed by Software House. It includes a query language, data management commands, a report writer, and a host language interface to COBOL and FORTRAN.**

- **Financial Modeling Language - CUFFS**

**This is a financial modeling language developed by CUFFS Planning & Models, Ltd. Financial models can be easily prepared and modified due to its extensive features designed to enable an executive to work with his model himself.**

**Security Precautions (Facilities, User Data, System Access)**

**As a matter of policy, Landart Systems Inc. does not publish details about its security precautions. We will discuss this in person with any customer who would like more information.**

**Facilities - Access to the computer environment is limited to employees who need access. The computer facility is adequately protected.**

**User Data - File protection is inherent between directories so that no user can access another user's data. A user can further protect specific files within his directory. Daily, weekly and monthly dumps are taken. Tapes cannot be removed without authorization from a user.**

**System Access - System access is provided for teletype compatible hard copy or CRT terminals at 10, 30 or 120 cps. Access can be made locally or from any Telenet Network access city. Various procedures are established to limit access to authorized users.**

Company Name : **MANUFACTURING DATA SYSTEMS INCORPORATED**Headquarters Address : **4251 Plymouth Road  
Ann Arbor, MI 48105**Telephone No.: **(313) 995-6000****Corporate Description:**

**Manufacturing Data Systems Incorporated (MDSI)** is a public company formed in 1969 to provide computer design and computer aided manufacturing services to the manufacturing operations of diverse industrial companies.

Approximate Number of Employees: **500**Approximate Number of Users : **5,000****Corporate Officers:**

**Kenneth R. Stephanz**  
**Richard M. Wood**  
**Jon G. Ehrmann**  
**Charles S. Hutchins**  
**Michael J. Long**  
**Richard A. Stitt**  
**Rex S. Wolf**  
**Stephen A. Imredy**  
**John W. Shuman**

**Pres. & Chief Exec. Officer**  
**Secretary**  
**Treas. & V.P. - Finance**  
**V.P. - Research & Dev.**  
**V.P. - Marketing**  
**V.P. - Administration**  
**V.P. - Operations**  
**V.P. - International**  
**V.P. - Corp. Development**

**Areas of Specialization**

MDSI's principal effort since inception in 1969 has been the development and marketing of **COMPACT II**, a proprietary computer language and software system, which is today the most widely used system for computer assisted programming of numerically controlled machine tools. MDSI has established a **COMPACT II** customer base in North America of over 5,000 users of approximately 9,000 such machine tools. **COMPACT II** has been available principally in a time-sharing mode through the telecommunications networks and mainframe computers of two independent commercial time-sharing sources. Since November 1974, it has also been available on a minicomputer-based system, and presently is being offered for use with in-house IBM System 360/370 computers. Through its overseas subsidiaries, MDSI has been providing **COMPACT II** to customers in the United Kingdom, France, Belgium, Switzerland, Japan and Germany.

MDSI and **COMPACT II** are registered trademarks of Manufacturing Data Systems, Inc.

**Security Precautions (Facilities, User Data, System Access)**

The vendor of the network and mainframe has total responsibility for the facility security. This includes multiple installations, fire protection, electronic surveillance and guards. They also have total responsibility for the security of user data, including file access protection, file encrypting, and off-premise storage of back-up tapes.

System access is the joint responsibility of the vendor and MDSI. Access is controlled by combinations of codes and passwords, some of which are invisible. MDSI assigns and maintains these codes. The vendors validate the codes at the time of log-in by a user.



Company Name : MARTIN MARIETTA DATA SYSTEMS

Headquarters Address : 300 East Joppa Road  
Baltimore, MD 21204

Telephone No.: (301) 321-5744

**Corporate Description:**

Martin Marietta Data Systems (MMDS) is a Division of the Martin Marietta Corporation. Nationwide Computer Network Includes 370/168's and 3033's small 370 satellite computers and remote concentrators, providing simultaneous batch and interactive processing, economics of scale and toll free access.

Approximate Number of Employees: 2,200

Approximate Number of Users : \*

**Corporate Officers:**

Barry D. Rowe  
Robert E. Burns  
Richard J. Walters  
Carl G. Smith

President  
V.P. - Commercial Operations  
V.P. - Computer Products & Serv  
Director, Marketing Services

**Areas of Specialization**

**MODULAR APPLICATION SYSTEMS (MAS):** Manufacturing Control, Inventory Control, Cost Control, Financial Control, Customer Order Control, Purchasing, Business Planning.

**OTHER BUSINESS APPLICATIONS:** Distribution/Wholesale, Engineering Design (TRMS), Travel Tours Booking, Real Estate Investment Trust (REIT).

**PRODUCTIVITY AIDS:** IMS Data Base Analyzer, Martin Information Retrieval Technique (MIRT), MMDS-Project Management Systems (MMDS/PMS), Standard IBM utilities and more.

**SCIENTIFIC APPLICATIONS:** An extensive range.

**SYSTEMS DEVELOPMENT & TECHNICAL CONSULTING:** We build systems by providing systems analyst, programmers and implementors to augment client resources; we perform systems development with performance and maintenance guarantees; our software technologists, Independently or as part of a business application project, are available on a consulting basis.

\*RJE 240; TSO/Interactive-3,500; IMS/On-Line-450

**Security Precautions (Facilities, User Data, System Access)**

**FACILITIES:**

- Cipher locks on external doors and doors leading to computer room
- All employees are required to wear picture badge with DOD Security Clearance Color Coded
- All visitors are required to register in and out and wear a visitor-limited access badge
- Halon fire extinguisher protection with heat/smoke detectors
- Fireproof vault for tape and disc storage
- Redundancy of computer systems, peripherals, file back-up, off-site storage and a contingency plan covering back-up and recovery
- Comprehensive employee training in fire prevention with periodic inspections by Fire Insurance Underwriters
- Communications network has back-up features including planned trunk communication redundancies
- Uninterruptable power supply (UPS) prevents multiple blackouts and brownouts

**USER DATA-ACCESS SECURITY:**

- Resource Access Control Facility (RACF). RACF allows the user to structure data set profiles for access authority (e.g., Read Only or Update).
- Data encryption can be accomplished using a subroutine called SAFEguard. Safeguard offers  $2.2 \times 10^{38}$  possible encryption algorithms.

**SYSTEM ACCESS:**

- Sign-on requires unique high level qualifiers, password and account number verification.

Date: July, 1979

Submitted By: Carl G. Smith, Director of Marketing Services

**Company Name** : MCAUTO (McDonnell Douglas Automation Company)**Headquarters Address** : P. O. Box 516  
St. Louis, MO 63166**Telephone No.:** (314) 232-4640**Corporate Description:**

MCAUTO, a division of McDonnell Douglas Corporation was established in 1960 to provide computer services for commercial clients. Today, MCAUTO operates 111 computer systems in data centers nationwide to serve a highly diverse group of clients.

**Approximate Number of Employees:** 4,700**Approximate Number of Users** : 2,300**Corporate Officers:**

W. R. Orthwein, Jr.	President
R. L. Harmon	Exec. V.P., Commercial
A. J. Quackenbush	Exec. V.P.
W. R. Vickroy	V.P., Marketing
C. M. Barlow	V.P., Health Services
T. M. Bellan	V.P., Comp. Serv. St. Louis
D. E. Anderson	V.P., Comp. Serv. West
R. V. Coleman	V.P., Technical Services
G. T. Rose	V.P., National Sales

**Areas of Specialization**

MCAUTO provides a complete range of computer services including: data entry/data conversion (keypunch, key-to-disk, OCR and MICR), programming, consulting, remote job processing, and timesharing.

Basic processing capabilities are provided through two major services known as the MCAUTO 370 Service and the MCAUTO CYBER Service. Both services offer interactive, remote batch and conversational batch processing within its own hardware complex. However, in addition to this, the 370 Service and the CYBER Service are linked together to support clients who need access to both services.

MCAUTO places special emphasis upon the following application areas:

- Engineering
- Project Management and Control
- Financial
- Data Base (IMS and System 2000)
- Graphics
- Word Processing
- Manufacturing/Distribution
- Insurance
- Health Care
- Communications

**Security Precautions (Facilities, User Data, System Access)**

System access is controlled by a unique user number assigned by MCAUTO and by a non-legible password that is controlled by the user.

User data may be secured through (1) unique passwords that may be associated with each individual file the user created and/or (2) assigning specific lists or user numbers that may access a file. The owner of the file can further define how the file may be accessed, i.e., execute only, read only, read and write, or append only.

Further integrity of user data is assured by system backup procedures which save, on magnetic tape, files created or changed by the user. These tapes are saved for specific periods of time, and the user may restore a file from them at no charge.

As facility security, MCAUTO maintains a fireproof walk-in vault for storage of tapes and disks, Cypher Locks on all computer room doors, and controlled access to all facilities.



## COMPANY DIRECTORY

# Company Profile and Security Precautions

A.260

Company Name : MELLONICS INFORMATION CENTER - LITTON SYSTEMS, INC.

Headquarters Address : 6701 Varlel Avenue  
Canoga Park, CA 91303

Telephone No.: (213) 887-5100

**Corporate Description:**

MIC was formed as a consolidation of two Litton computing centers in 1968. A division of Litton Systems, Inc., MIC now offers both time-sharing and remote batch capability on two IBM 370/3033's via a national teleprocessing network.

Approximate Number of Employees: 225

Approximate Number of Users : 300

**Corporate Officers:**

J.F. Soderer  
J.L. Cudworth  
C.H. Schwedes  
G.H. Gerler  
N. Weaver

V.P. & General Manager  
Director of Marketing  
Dir. of Litigation Support  
Dir. of Technical Services  
Dir. of Computer Systems

### Areas of Specialization

MIC has resources and experience to offer a full-service range of data processing capabilities. Advanced IBM equipment - Dual 370/3033's - and a staff of D.P. professionals provide cost-effective service. • Nationwide Communications • TSO 10 to 120 CPS Interactive and Remote Batch Processing, IMS, GIS, STAIRS.

Remote Job Entry - RJE is provided by IBM's JES2 system. Communication is provided by leased and dial telephone lines at speeds ranging from 2000 BPS to 40.8K BPS.

Technical Support and Hotline Service is provided at no charge between 8-5, Monday-Friday, to users to solve computing problems. • Applications Development - MIC maintains a staff of qualified programmers for custom program development.

SOFTWARE - A variety of financial reporting, planning and modeling packages are available including are RAMIS and FORESITE. Other packages include: TOTAL, IMS, SOFTOOL, APT-AC, ATS, BMD, DUO, GRP, LINKAGE EDITOR MVS, PMS IV, RPG II, SORT (OS/VS), SPSS, SSP (FORTRAN), SSP (PL/1).

COMPILERS AND UTILITIES - Offered are ANS 4.0, COBOL, OS/VS COBOL, FORTRAN G1, FORTRAN H EXTENDED, PL/I OPTIMIZING, PL/I CHECKOUT, OS/VS ASSEMBLER, ASSEMBLER H, VS BASIC, GPSS V, CSMP III, SIMPL/I-CALCOMP, DYL 250 & 260, FDR & PANVALET.

### Security Precautions (Facilities, User Data, System Access)

**FACILITIES** - The facility is guarded at all times and access to the computer room is limited to Mellonics personnel in the course of performing their assigned duties. All entrances to the computer room are equipped with Schlage Electronic multi-door proximity actuated access control system.

**USER DATA** - User data can be protected against unauthorized access through multi-levels of passwords. User data residing on On-line Track Storage volumes is backed up on a regular schedule.

**SYSTEM ACCESS** - On-line users of the system (TSO, RJE, ATS, IMS) are controlled by various USERID, and signon password schemes. Batch access is controlled by validating accounting information.

*Armando Dulay*

Date: July, 1979

Submitted By: John L. Cudworth, Director of Marketing



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.270

Company Name : **METROCOM INC.**

Headquarters Address : **1500 Southern Nat'l Center, 200 S. College St.  
Charlotte, NC 28202**

Telephone No.: **(704) 374-1990**

**Corporate Description:**

**Organized as a privately held corporation in 1971**

Approximate Number of Employees: **25**

Approximate Number of Users : **380**

**Corporate Officers:**

<b>Tarokh Taefi</b>	<b>Chairman of the Board</b>
<b>Tarokh Taefi</b>	<b>President</b>
<b>Ray Bennett</b>	<b>V.P. - Systems</b>
<b>Clinton R. Collins</b>	<b>V.P. - Applications</b>
<b>E. E. Mason</b>	<b>V.P. - Mgt. Consulting</b>

### **Areas of Specialization**

The concept underlying the development of Metrocom was to fulfill to the remote-computer user all of the facets of his processing, which resulted in the following areas of specialization:

- **Software Development** - we maintain a staff of programming and technical support to assist customers in writing their own programs, for program conversions, and for the development of new or additional applications. Furthermore, a vast library of programs is available and can be accessed and modified by any user.
- **Management Consulting Services** - in conjunction with our program development, Metrocom also maintains expertise relevant to specialized areas of engineering, operations research, accounting and finance, statistics, and data base management.
- **Terminal Sales and Leasing** - due to the critical interrelationship between the computer and related communications devices, we lease, sell, and maintain various types of remote computing terminals through O.E.M. contracts with major vendors.
- **Miscellaneous Services** - such services as classroom instruction, training in system commands and program languages, art work and printing of various computer forms, and technical documentation are available.

### **Security Precautions (Facilities, User Data, System Access)**

As of September 1, 1976, with the installation of a Honeywell 66/60, Metrocom is pleased to announce the opening of its large-scale computer facility in Charlotte, N.C. This particular location is equipped with the most advanced techniques in hardware security, personal access, fire and theft prevention, and back-up retrieval.

All user disk files are captured nightly on dual copy magnetic tape and are stored at the computer site in a controlled environment and also at a site adjacent to the computer facility.

User access to the system through telecommunication lines is secured by a password sequence as well as a permissions hierarchy.

Date: **July, 1979**

Submitted By: **Tarokh Taefi, President**



Company Name : **MRI SYSTEMS CORPORATION**Headquarters Address : **12675 Research Boulevard  
Austin, TX 78759**Telephone No.: **(512) 258-5171****Corporate Description:**

Founded in 1965 as an operations research and consulting firm (Management Research International, Inc.), MRI functioned as a closely held company with a Canadian subsidiary and sales offices in ten foreign countries until February, 1979, when it became a wholly owned subsidiary of Intel Corporation.

Approximate Number of Employees: **250**Approximate Number of Users : **1,300****Corporate Officers:**

**Robert L. Brueck**  
**Kent A. Ochel**  
**Sam T. Byars**  
**Ronald R. Bush**

**President**  
**Executive V.P.**  
**Sr. V.P. - Marketing**  
**V.P. - Business Development**

**Areas of Specialization**

MRI Systems Corporation is known as "The Data Base Management System" because, ever since it released the first version of its DBMS called SYSTEM 2000 in 1970, it has exclusively concerned itself with developing, marketing, supporting, and enhancing outstanding software. This software is available, on a royalty basis, through RCS vendors licensed to sell SYSTEM 2000 and related services. It is also available to organizations with in-house computers under a variety of rental and leasing options.

The product line presently includes SYSTEM 2000®, TP 2000®, and CONTROL 2000®. SYSTEM 2000 is a generalpurpose DBMS that provides users with both a set of self-contained facilities for using English-like languages and a programming facility for use with COBOL, FORTRAN, PL/I, or Assembler procedural-language programs or applications. TP 2000 provides all the facilities needed for the on-line interfacing of SYSTEM 2000 application programs and data files with teleprocessing terminals. CONTROL 2000 is a data dictionary/directory that significantly expands the power of SYSTEM 2000 users to inventory and control data as an organization-wide resource.

As "the data base management company," MRI provides both standard and special or contract services. These include data-management consultation, documentation, and training. MRI has a variety of educational programs for quickly training people to use SYSTEM 2000.

**Security Precautions (Facilities, User Data, System Access)**

Both SYSTEM 2000 and CONTROL 2000 have features to ensure the integrity of data bases. These include features to prevent misuse of SYSTEM 2000 data bases and to safeguard data bases from damage or loss through mechanical failures.

To ensure the privacy of data, SYSTEM 2000 users can prevent unauthorized personnel from using remote terminals through use of terminal password identifications. Users can also use passwords to ensure security at the systems, the data base, the command, and the item levels.

At the item level, SYSTEM 2000 provides three kinds of access control. For any given item, a user might be restricted only to the retrieval of information. Another user, in contract, might be given power only to update the values for a given item or items. Still another user might be restricted to using given items only in conjunction with access commands containing "where" or "if" clauses. As an example of item-level security, assume a PERSONNEL data base containing a wide variety of data about an organization's employees. A receptionist, though, might be restricted in access to it only for the purpose of obtaining information about the names, telephone numbers, and addresses of company employees. All other information about employees would be beyond her power to access.

To protect a data base from loss, SYSTEM 2000 maintains a record of all update entries. Since organizations typically maintain one or more archival copies of original data bases on magnetic tape, they may easily replace a damaged or destroyed data base by using the update log to update an archival copy.





Company Name : MULTIPLE ACCESS COMPUTER GROUP

Headquarters Address : 885 Don Mills Road  
Don Mills, Ontario M3C 3H1

Telephone No.: (416) 443-3900

Corporate Description:

Multiple Access Computer Group, a full service company, is a division of Multiple Access Limited founded in 1969, a publicly held company. Interactive processing services are offered throughout Canada via toll-free dial up lines and throughout the U.S. via the TELENET network.

Approximate Number of Employees: 350

Approximate Number of Users : 4,000

Corporate Officers:

J.O. McCutcheon	President
L.R. Parker	Vice-President
A. Prozes	Vice-President
B.N. Danter	Sec. - Treas.

Areas of Specialization

SERVICES

Conversational Time-Sharing  
Remote Job Entry  
Consulting  
Systems/Programming  
Project Management  
Supportive Consulting  
Financial Amortization Schedules  
Keydata Services for Canada  
Financial/Administrative Services to  
Banking, Brokerage, Investment  
Communities  
Custom Hardware, Logics - Turnkey  
Systems to Manufacturing,  
Processing and Control Industries

APPLICATIONS (currently, more than 90 prominent programs)  
Corporate/Financial Modeling/Simulation - FIPAC, MPS-F, FINMOD  
Forecasting - A.M.S., X-11  
Management Sciences & Statistical Packages - SPSS, OPHELIE, BMD  
Project Management - PMCS, PROPLAN  
Data Base Management Systems - ATHENA, SYSTEM 2000, SIR  
Interactive Graphics/Plotting - SCAN99, CALCOMP  
Electrical/Electronic Engineering - INT/POWER, SPICE 2,  
WESTINGHOUSE  
Civil Engineering - Hydraulics, Hydrology & Water Management  
Soils, Surveying/Photogrammetry - FLOW, HEC, COGO, SURVEY  
Structural Engineering - AMECO, PCA, SAPIV, STRESS 3.0  
General Finite Element Programs - ANSYS, NASTRAN, STARDYNE  
Mechanical Eng. - Piping & Pressure Vessel Design - DYNAFLEX,  
AAA Tech.  
Petrochemical Engineering - COMPAID, HEATX, DR 01, SSI/100

Security Precautions (Facilities, User Data, System Access)

FACILITIES - Modern building with specially designed operations areas, Security guards 7 days per week. All building entrances locked after normal working hours. Restricted access to computer facilities. Visitors permitted only under personal escort. Adjacent areas in the operations section protected by cypher locks. Automatic security service alert upon opening of alarmed doors. Automatic fire alarms security service monitored. Uninterruptible Power System: battery-type plus self-starting diesel generators for any extended outage - no shut down for any power reason. Redundant communications with line checking and monitoring.

USER DATA - Access to user data is by Account Code, non-legible Security Code, User Number. User may optionally further protect files through multiple passwords and specific file processing permissions. All files are locked to user unless specific other user permission(s) granted by user. User has interactive control over file-names, passwords and the other various permissions. Private user file catalogs record number of accesses, time and date of last access, etc. User may interactively initiate own tape back-ups of disk files.

SYSTEM ACCESS - Access to system is by Account Code, non-legible Security Code and User Number. Nowhere on any hard copy in the system does the Security Code appear. Security codes are maintained separately under strict supervision. System files and programs are under separate file privilege protection. Privileged system commands can be initiated only from dedicated consoles. Accidental disconnect recovery is provided.



Company Name : NATIONAL COMPUTER NETWORK of CHICAGO, INC.

Headquarters Address : 1929 North Harlem Avenue  
Chicago, Illinois 60635

Telephone No.: (312) 622-6666

**Corporate Description:**

Founded in 1969 and is privately held.

**Corporate Officers:**

James A. Leopold  
Leonard D. Bole

President  
Vice President

Approximate Number of Employees: 12

Approximate Number of Users : 2000

**Areas of Specialization**

- Interactive Time-Sharing, Remote Batch and Local Batch service utilizing: Honeywell 1648 Systems, DEC System 20.
- Interactive Data Bases: Stocks; Bonds; Options; Commodities; Financial Instruments.
- Specialized Packages: Electrical Engineering; Statistical.
- International Access.
- Software Development.
- Applications Packages/Library Routines.
- Professional Staff to Assist User.

**Security Precautions (Facilities, User Data, System Access)**

**FACILITIES:**

- Equipped with modern alarm systems.....burglar, fire, smoke and heat.
- Restricted Access.

**USER DATA:**

- Access protection is provided by User ID/Password and optional File Password.
- Daily Save Tapes for 8 days.
- Month-End Saves for 6 months.

**SYSTEM ACCESS:**

- Alpha Numeric ID and protected password at Sign-On.
- Optional project and account verification at Sign-On.
- Files may be User Permitted, Protected and Passworded.



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.310

Company Name : **NATIONAL CSS, INC.**

Headquarters Address : **187 Danbury Road  
Wilton, CT 06897**

Telephone No.: **(203) 762-2511**

**Corporate Description:**

Formed in 1967, National CSS, a publicly held corporation, serves the business community in computer techniques, communications, system development, and software application.

Approximate Number of Employees: **1,260**

Approximate Number of Users : **11,000**

**Corporate Officers:**

<b>Robert Weissman</b>	<b>President</b>
<b>Richard Bayles</b>	<b>VP - Controller</b>
<b>David Fehr</b>	<b>VP - Computer Services Group</b>
<b>Harold Feinleib</b>	<b>VP - Systems Development</b>
<b>Michael Field</b>	<b>VP - Data Systems</b>
<b>John Pryor</b>	<b>VP - Sales</b>
<b>Alan Rlevman</b>	<b>VP - Finance</b>
<b>Les Srager</b>	<b>Sec., Gen. Counsel</b>

### **Areas of Specialization**

National CSS, Inc. is a multi-national corporation supporting a broad range of customer-defined services in remote computing. With a customer group of over 11,000 businessmen and scientists, representing some 600 different applications, NCSS is a leader in the information service industry.

The NCSS computer network has been specifically designed for simultaneous scientific and business data processing. The basic hardware of the network consists of two IBM 370/168's and IBM 3033, and an IBM compatible AMDAHL 470 V/611, installed in three separate computer centers in Stamford, Connecticut and Sunnyvale, California plus PDP 11's in network.

The primary interface between the customer and the hardware resources of the operating system software is called VP/CSS. In general, NCSS application software deals with the following areas:

**SCIENCES** - The company offers a variety of engineering applications on its network. Among them are electrical, chemical, environmental, and mechanical programs dealing with such areas as: circuit design and analysis, microprocessor development and design, fluid flow analysis, logic analysis, filter design, and HF and microwave analysis.

**BUSINESS** - Software in this area includes applications for language programming, data base management systems, business research, financial planning, operations research, accounting systems, and industrial and information management.

### **Security Precautions (Facilities, User Data, System Access)**

Facilities include a seven day, 24 hour guard service, a card key system programmed to allow access to authorized personnel only (all entry and egress is recorded on hard copy as to card key, date, and time), and combination doors. A videotape monitoring system augments the above.

The user has the ability to define his own level of security through system and program passwords for:

- NO ACCESS BY ANY OTHER USER
- READ OR WRITE ACCESS
- UPDATE ACCESS

A user defined password must be entered correctly before access to any part of the system. (This may be changed daily by the user.) A special procedure or profile, if present, will automatically be executed, where the user can incorporate additional security features.

Date: **July, 1979**

Submitted By: **Joel Marcuse, Manager of Publications**



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.320

Company Name : **ON-LINE SYSTEMS, INC.**

Headquarters Address : **115 Evergreen Heights Drive  
Pittsburgh, PA 15229**

Telephone No.: **(412) 931-7600**

**Corporate Description:**

**Incorporation: 1967**

**Ownership : American Exchange (ONL)**

**Approximate Number of Employees: 512**

**Approximate Number of Users : Over 5,000**

**Corporate Officers:**

**John Godfrey  
Jack Roseman  
Charles D. Daley  
Brian D. Wiltshire  
William R. Newlin**

**Chairman  
President  
V.P. Finance & Treasurer  
V.P. Marketing  
Secretary**

### **Areas of Specialization**

On-Line Systems offers design of management information systems and applications, utilizing specialized software and an international communications network. The company also offers general purpose conversational time-sharing to users nationwide and in Canada and the United Kingdom. The services are geared toward all facets of business and industry and are directed at both the experienced programmer and the computer novice. Service includes rapid implementation, customer training, and technical documentation.

On-Line Systems also develops computer programs for sale or lease, offers computer facilities management services, and sells computer equipment it has designed (for example, a communications control interface).

On-Line Systems offers a family of computer systems for planning, control, and evaluation. These systems include:

<b>OSCAR</b>	- A project management system
<b>ORBIS</b>	- A budgeting and monitoring system
<b>FMS</b>	- A planning and modeling system
<b>OMAR</b>	- A marketing information system
<b>OLIVER</b>	- A data base management system

The systems can be individually or collectively applied to management information needs.

### **Security Precautions (Facilities, User Data, System Access)**

**PHYSICAL** - Uninterruptible power system and dual power source; no exterior windows to allow viewing; fireproof tape vault; floor and ceiling fire and smoke detection in computer room; dry sprinkler system in computer room, wet elsewhere in facility; modular air conditioning; locked and alarmed access doors; dual emergency generator system - natural gas; security guards utilizing Detex clock system and radios; control of all visitors by sign-in and badge system; all employees required to have identification card with picture; building construction of block and concrete - all floors concrete; computer room alarm system for temperature and humidity control; computer room access highly restricted.

**USER DATA AND SYSTEMS ACCESS** - Company number, user number, project code, and password protection; daily, weekly, and monthly disk dumps; accidental disconnect recovery; file read, write, and execute protection levels; audit trail capability through project code.

Date: **July, 1979**

Submitted By: **Kenneth R. Marino, Manager, Information Services**



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.330

Company Name : **POLYCOM SYSTEMS LIMITED**

Headquarters Address : **133 Wynford Drive  
Don Mills, Ontario, Canada M3C 1K1**

Telephone No.: **(416) 449-3400**

**Corporate Description:**

**Year of formation: 1968 (Private). Converted to a public company in December 1969.**

**Corporate Officers:**

**D.C. Webster  
Robert L. Shirriff  
E.J. Gougeon  
A.L. Francescut**

**Pres. & Chairman of the Board  
Secretary  
V.P. - Operations  
V.P. - Sales**

Approximate Number of Employees: **40**

Approximate Number of Users : **350-400**

### **Areas of Specialization**

- Order Entry, Inventory Control
- Data Base Management Systems
- Accounting and Financial applications
- Statistical applications
- Financial Modeling and Forecasting
- Job Costing systems
- Information Retrieval systems
- Program development

### **Security Precautions (Facilities, User Data, System Access)**

**FACILITIES** - The PolyCom datacentre is located in Don Mills, Ontario, Canada. Access to the computer room is restricted to only operating personnel and no one else may enter without top-level authorization. The system hardware is serviced on a daily basis by on-site field engineers. In addition, modern air-conditioning equipment and detection devices ensure environmental protection.

**USER DATA** - The files and programs within each user's library catalog can be protected at a number of different security levels to the point where PolyCom itself would not be able to gain access to them. Among the various security features available to users are: File names, passwords, file permissions, file locks, tape file protection, daily file back-ups.

**SYSTEM ACCESS** - Protection against unauthorized access to important and confidential information is provided by such features as: user numbers, passwords, catalogs, user groups, sub accounts, sub catalogue, and a variety of user controls.

Date: **July, 1979**

Submitted By: **A.L. Francescut, Vice President - Sales**



Company Name : PROPRIETARY COMPUTER SYSTEMS, INC.

Headquarters Address : 16625 Saticoy Street  
Van Nuys, CA 91406

Telephone No.: (213) 781-8221

## Corporate Description:

Proprietary Computer Systems, Inc., offers APL-based computing, text processing, RJE, batch processing, and software systems.

Approximate Number of Employees: 140

Approximate Number of Users : 3,000

## Corporate Officers:

Bill Barancik	President
Victor A. Diels	Sr. Vice President
Warren Juran	Vice President
James R. Koch	Vice President
Donald W. Peterson	Vice President
Norman Williams	Vice President
Delbert Letourneau	Vice President

## Areas of Specialization

Historically, PCS has devoted a substantial part of its resources to enhancing APL and ATS, evolving proprietary systems (called PCS/APLSV and PCS/TEXT) that incorporate such major advances as inputting from video terminals, mixed on-line and batch processing and system commands that make it easier for users to handle complex applications with minimum possibilities for error. In addition, PCS's technical staff has developed comprehensive software systems dedicated to applications in business, finance, real estate, government, and the professions. PCS has pioneered "Programmerless Programming," an approach that allows users with no data processing experience to program and run their own applications.

The most popular current systems in this family are:

PCS/INFO — a database management system used by financial analysts and administrators to select and manipulate data stored in on-line files. INFO can produce graphical reports in the form of plots and bar charts.

PCS/REPORT - a report-writing system used by analysts and administrators to prepare attractively laid-out management reports—which can involve extensive computations and the consolidation of separate files.

PCS/FORECAST - a decision-making tool used in preparing finished reports derived from data stored in on-line data bases. Some natural FORECAST applications are budgets, forecasts, competitive price analyses, financial statements, and cost estimates.

## Security Precautions (Facilities, User Data, System Access)

PCS's computer center, one of the largest in Southern California, has dual IBM 370/158 and 3031 CPUs, supported by 370 software and peripherals. The data processing system is located in a controlled access area protected by electronic locks.

User data is stored on-line in workspaces or in data files. APL workspaces are protected by a three-level security system of user number, workspace name, and optional password. Access to files is controlled by hard-coded security features in the file system. Each file includes an access control table that may be set by the file owner to allow selected types of access (e.g. read-only) by specified users.

Access to the system is controlled by a combination of user numbers and a user-controlled password which may be changed at the end of a time-sharing session.





**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.350

Company Name : **PRYOR CORPORATION**

Headquarters Address : **400 North Michigan Avenue  
Chicago, Illinois 60611**

Telephone No.: **(312) 644-5650**

**Corporate Description:**

The Remote Computing Division of Pryor Corporation was formed in 1969. The Corporation, which was founded in 1959, has one other division, the Supplies Division which manufactures and markets computer supplies in the midwest and eastern seaboard states.

Approximate Number of Employees: **15**

Approximate Number of Users : **200**

**Corporate Officers:**

**W. Lee Pryor  
W. B. Martin  
Robert A. Hull  
W. C. Avery, Jr.**

**President  
V.P. - Remote Computing  
V.P. - Supplies Division  
V.P. - Supplies Division**

### **Areas of Specialization**

**SMALL BUSINESS SERVICES** - The on-line package, RC/BASIC (Remote Computing for Billing, Accounts Receivable, Sales Analysis and Inventory Control), is offered to small businesses. The applications include order processing, open order control (manufacturing, sales and purchase orders), invoicing, accounts receivable, sales analysis, finished goods and raw material inventory control and bill of material explosion. All of these programs are modules that are integrated into the full RC/BASIC Package. We can implement any combination or all modules in a completely integrated system. Also offered are accounts payable, payroll and general ledger systems.

**COMPUTERIZED FINANCIAL DECISION-MAKING PACKAGE** - These programs provide a wide range of in-depth analytical tools for the financial executive and analyst. This package consists of a set of remarkably flexible programs, each designed for a particular financial application. The financial applications that the Computerized Financial Decision-Making Package addresses include: (1) calculation of cash flow or investment streams on a present value and internal rate of return basis; (2) ownership versus leasing decision analysis; (3) complete asset analysis and projections for real and personal property; and (4) three very complete and flexible loan programs for mortgage and bank debt, wrap-around loan analysis and construction interest and project payment cash flow projections.

**GENERAL TIME-SHARING** - General time-sharing is also offered. This includes library routines for forecasting, modeling, curve fitting, etc.

### **Security Precautions (Facilities, User Data, System Access)**

**FACILITIES** - Building and office access is controlled by twenty-four, seven day per week guard. Building passes are required for all employee personnel. Computer room access through locked doors. Computer room is monitored by smoke and heat detector system, and constantly monitored by alarm company computer.

**USER DATA** - Incremental back-up--Twice per day complete back-up--Daily saved for six-week period. End of month tapes by date and by customer saved for three years. All tapes are stored in fireproof vaults off premises. Access to user data is available through access permission privileges and passwords. Special optional protection is available featuring a system-generated scramble/unscramble key known only to the user.

**SYSTEM ACCESS** - Standard sign-on requires entry of account number and password. User or administrator may change password.

Date: **July, 1979**

Submitted By: **W. B. Martin, Vice President**



Company Name : **RAPIDATA, INC.**Headquarters Address : **20 New Dutch Lane  
Fairfield, NJ 07006**Telephone No.: **(201) 227-0035****Corporate Description:**

Company established in 1967. Ownership - Public OTC-Ticker Symbol "RAPD". Rapidata is a remote access computer company specializing in financial services, that provides a broad spectrum of services to utility, banking, financial, industrial and governmental customers. Offices-Principal cities & Western Europe.

Approximate Number of Employees: **350**Approximate Number of Users : **6,000****Corporate Officers:**

**Alvin S. Lane  
Robert J. O'Brien  
Curtis M. Huff  
Martin M. Glassberg  
Thomas L. Campbell**

**Chairman of the Board  
President  
V.P. - Sys. Dev. & Op.  
V.P. - Finance  
V.P. - Marketing**

**Areas of Specialization**

Rapidata provides general and specialized computer software tailored to a customer's requirements. It offers application packages and languages (FORTRAN, BASIC, COBOL) proprietary and public data bases, programming services and data base management services, some of which are highlighted below. These services are provided on Honeywell dual Processor 437s, RAPIDTEN (DECsystems 1070 and 1080), DECsystems 2020 as well as other selected minicomputers, and are accessed on a conversational or remote batch basis via RAPIDNET, a nationwide toll-free network.

**FINANCIAL SERVICES - FISCAL, PROBE, CASH MANAGEMENT, CAPITAL ASSET MANAGEMENT, AND CLIENT ACCOUNTING SYSTEM.**

**DATA MANAGEMENT AND REPORTING - X2C, DBMS-10.**

**DATA BASES - RAPIDQUOTE, CITIDATA, FEDERAL RESERVE BANK OF SAN FRANCISCO, INTERNATIONAL FINANCIAL STATISTICS, MARKET STATISTICS, TELERATE, BALANCE OF PAYMENTS, AND CENTRAL STATISTICAL OFFICE (U.K. ECONOMIC DATA).**

**UNIQUE CAPABILITIES - RAPIDVOICE - a voice response service with system access via push button phones. RAPIDLINK - Interface for interchanging data directly to customer's in-house computer. DATA EXCHANGE UNIT - a software interface which allows the transfer of data between all of Rapidata's systems. SYSTEM EXCHANGE UNIT - an interface which provides the user with the ability to transfer from system to system without interrupting operation.**

**Security Precautions (Facilities, User Data, System Access)**

**PHYSICAL SECURITY -** Rapidata has incorporated security measures against the risks which stem from the uncertainties in the environment as well as from the unpredictability of human behavior. The major safeguards are: Electronic lock and badge system for authorized personnel. Professional security patrol utilizing Detex clock system. Floor and ceiling fire and smoke detection in computer room. Wet pipe fire protection sprinkler system in use in other areas. Interior alarm system for temperature, humidity, unauthorized access control, voltage transients, and air conditioner failure. Multi-machine redundancy.

**USER DATA -** Daily, weekly, monthly disk dumps saved for 1, 4 and 26 weeks respectively. Copies of monthly and weekly tapes stored in different facilities. All customer tapes stored in fireproof vault. Tape/disk procedures and security measures regularly audited by Board of Directors Security Committee. Accidental disconnect backup.

**SYSTEM ACCESS -** Sign on control-use of user name, password and account code. Sophisticated password protection assignable to a user file or data elements within the file. User may write programs to permit or deny access using any criteria. Data encryption is accomplished via sophisticated file scrambling technique. Billing Detail - provides daily audit trail.



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.370

Company Name : **REMOTE COMPUTING CORPORATION**

Headquarters Address : **1076 East Meadow Circle  
Palo Alto, CA 94303**

Telephone No.: **(415) 494-6111**

**Corporate Description:**

**Formed In 1968. Publicly held, but not traded.**

Approximate Number of Employees: **160**

Approximate Number of Users : **2,0000**

**Corporate Officers:**

**I.R. Rector  
C.G. Calderaro  
J.H. Light  
P.M. Lumish  
L.A. Palmer  
R.P. Schmelz**

**Chairman of the Board  
President  
V.P. - Development  
V.P. - Product Marketing Div.  
V.P. - Data Processing & Sys.  
V.P. - Major Account Mktg. Div.**

### **Areas of Specialization**

Remote Computing Corporation (RCC) is a diversified user-oriented service company; it develops and supports unique applications for specific industries as described below:

**COMPUTER SERVICES - General Time-Sharing and Remote Job Entry. Any large organization.**

**PRODUCTS AND SPECIALIZED APPLICATIONS**

**Automated Mortgage Market Information Network  
Financial Data Base, Models and Reports  
Financial Planning Systems  
GNMA and Bond Portfolio System  
Mortgage Loan Commitment  
Telephone Industry Applications  
Data Management System  
Accounting System for Contractors**

**Secondary mortgage traders  
Stock exchanges, commodities and options  
Savings and loans, mutual savings banks, comm. banks  
Thrift industry, commercial banks  
Thrift industry, mortgage banks, commercial banks  
Telephone industry  
486Any large organization  
Construction industry**

### **Security Precautions (Facilities, User Data, System Access)**

**FACILITIES -** The physical plant is guarded at all times and access to areas where material is stored is limited to certain personnel only. All entrances to the computer room are equipped with cypher push-button locks and alarms which are active 24 hours a day. Three classifications of access are established within the computer rooms: (1) Unlimited, No Escort; (2) Limited, No Escort; and (3) Limited, Escort Required.

**USER DATA -** File security is based upon the concept that it must be controlled at the user code level. Files are automatically "locked" to prohibit read and/or write access to any but the creating user code. The locked status may be modified by the creator to allow access to users specified by the creator if so desired.

**SYSTEM ACCESS -** A rigid security scheme exists which limits access to the computer system solely to authorized users. A customer-identifying "user code" is verified for accuracy by the computer system during the log-on procedure and is supplemented by a machine-encoded "password" known only to the customer. The log-on process to enter a valid user code with a corresponding valid password cannot be circumvented.

Date: **July, 1979**

Submitted By: **Phillip M. Lumish, V.P. - Product Marketing Division**



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.380

Company Name : **ROSS SYSTEMS, INC.**

Headquarters Address : **1900 Embarcadero Road, Suite 208  
Palo Alto, CA 94303**

Telephone No.: **(415) 326-1054**

Corporate Description:  
**Founded in 1972.  
Privately Held Corporation.**

Approximate Number of Employees: **25**

Approximate Number of Users : **200**

**Corporate Officers:**

<b>Kenneth Ross</b>	<b>President</b>
<b>Michael Novak</b>	<b>Executive Vice President</b>
<b>Edward P. Harley</b>	<b>Executive Vice President</b>
<b>Bruce R. Gail</b>	<b>Vice President</b>
<b>John Benedict</b>	<b>Vice President</b>
<b>Karol Hines</b>	<b>Vice President</b>

### **Areas of Specialization**

**MANAGEMENT CONSULTING SERVICES:** Ross Systems, Inc. provides professional systems services to manufacturing and financial clients. We design and implement timesharing and batch computer-based systems such as inventory control and production control: general ledger, accounts receivable, accounts payable, and budgeting, cash management, and lease analysis.

**TIMESHARING SERVICES:** Our proprietary financial modeling and reporting package, MAPS, is the focus for timesharing services offered on 3 PDP 11/70 computers running under RSTS/E. (MAPS is also licensed for use on a client's computer.) Ross Systems timesharing features include BASIC-PLUS, FORTRAN, and COBOL; a proprietary, line-oriented text editor; a high speed printer; and 2780-compatible remote job entry.

**IN-HOUSE TIMESHARING ASSISTANCE:** Ross Systems offer minicomputer technical assistance, timesharing facilities management expertise, and software systems to clients with present or planned in-house timesharing activities.

### **Security Precautions (Facilities, User Data, System Access)**

Ross Systems' security is comparable to other firms in the industry. Our computer facilities are locked and are available only to authorized personnel. System access is controlled via a password which prevents unauthorized users from accessing customer data. Data is protected from fire and theft by both on-site vault and off-site storage. Other confidential steps have been taken to guarantee the security of our facilities and data.

Date: **July, 1979**

Submitted By: **John Benedict, Vice President**



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.390

Company Name : **SCIENTIFIC TIME SHARING CORPORATION**

Headquarters Address : **7316 Wisconsin Avenue  
Bethesda, MD 20014**

Telephone No.: **(301) 657-8220**

**Corporate Description:**

**Founded in 1969, public (OTC)**

Approximate Number of Employees: **220**

Approximate Number of Users : **6,000**

**Corporate Officers:**

<b>Daniel Dyer</b>	<b>President</b>
<b>Patrick P. Gehl</b>	<b>Exec. V.P. - Mkt.</b>
<b>Kevin R. Weaver</b>	<b>V.P. - International</b>
<b>Philip S. Abrams</b>	<b>V.P. - Operations</b>
<b>Allen J. Rose</b>	<b>V.P. - Tech. Dir.</b>
<b>Robert C. Fick</b>	<b>V.P. - Treasurer</b>
<b>Robert E. Cook</b>	<b>V.P. - Planning</b>

### **Areas of Specialization**

- **APL**
- **Financial Planning and Modelling Services**
- **Financial Data Base Services**
- **Manufacturing and Materials Management Services**
- **Communication Network Planning Services**
- **Insurance Management and Computation Services**
- **VM/370 Timesharing Service (all languages including APL)**
- **Two APL Systems and Hardware for in-house use**

### **Security Precautions (Facilities, User Data, System Access)**

The Computer Center has limited access and most customary protections.

User data is protected by the interactive Interface (APL) plus an unusually sophisticated file access control and pass number system.

System access is limited by standard password protection.

Date: **July, 1979**

Submitted By: **Paula J. Brooks, Manager - Corporate Communications**



Company Name : SDC SEARCH SERVICE

(213) 829-7511

Headquarters Address : 2500 Colorado Avenue  
Santa Monica, CA 90406

(800) 352-6689 (CA only)  
Telephone No.: (800) 421-7229 (US except CA)

**Corporate Description:**

SDC Search Service is a division of System Development Corporation, founded in 1956.

**Corporate Officers:**

Thomas F. Collins  
William E. Burgess  
Donald V. Black

General Manager  
Director - Marketing & Training  
Technical Coordinator

Approximate Number of Employees: 50

Approximate Number of Users :

**Areas of Specialization**

SDC Search Service is an international on-line retrieval service offering access to data bases covering scientific, technical, and business literature as well as current grant information, world patent citations, U.S. Congressional proceedings and reports, social sciences, education, energy and the environment, and library and information sciences. The literature represented in these files is comprehensive in terms of subject areas covered, and worldwide in scope.

SDC Search Service provides a complete range of customer service in addition to comprehensive data base access, including same-day mailing of off-line printouts of searches, a complete program of user education, free consultation with information professionals via toll-free numbers, and the ability to order original documents on-line through the exclusive "Electronic Maildrop."

Charges are based only on the amount of service used with access from major cities throughout the world. There are no subscription fees and no minimum use requirements.

**Security Precautions (Facilities, User Data, System Access)**

SDC Search Service takes precautions to ensure security for users and data.

**SYSTEMS SECURITY** - A user ID is assigned to each user. This ID must be entered in order to use the system. IDs can be changed dynamically. A password may also be required in addition to the ID. User IDs associate a user with a particular user class, which allows access only to a specific subset of total system capabilities.

**USER SECURITY** - No user data are entered and stored permanently in the system and, therefore, security is required only to avoid poaching on a user's billing account. The user must use his ID to log in. A password may also be assigned dynamically to an ID by the user himself who may, thus, control his own security.

**DATA SECURITY** - Each user ID is assigned to a data base class. A data base class may access only a certain set of data bases. Within each data base, the user may access a certain set of fields. Data bases and fields not available to a user may not be detected.

Company Name : **THE SERVICE BUREAU COMPANY**Headquarters Address : **500 West Putnam Avenue  
Greenwich, CT 06830**Telephone No.: **(203) 622-2000****Corporate Description:**

**Division of Control Data Corporation since 1973;  
previously, an independent subsidiary of IBM.**

**Corporate Officers:**

**R. W. Kleinert  
C. J. Brown**

**President  
Senior V.P.  
Time-Sharing Services**

Approximate Number of Employees: **n.a.**Approximate Number of Users : **15,000****Areas of Specialization**

The Service Bureau Company (SBC) provides cost effective computer services, via an international data processing network, for management to use to complement and enhance in-house data processing capabilities.

SBC's CALL/370 Management Time-sharing Service has pioneered and led in satisfying the "information" needs of business managers at all levels, and specializes in helping them plan, analyze, and control their operations more effectively. Major CALL/370 features include MINI-MIS, a series of interactive data-base systems used for a broad range of applications involving inquiry, information retrieval, reporting, and file maintenance; PROPHIT II, a financial modeling language used by all industries for satisfying planning/analysis/modeling/reporting requirements; PICTURE-PAC, an easy-to-use graphics system; and numerous further applications for particular disciplines and individual industries. For more information, see MINI-MIS, PROPHIT II, TIMEPACK II, and PICTURE-PAC in the ATSU Applications Directory.

SBC's CALL/PLUS Remote Computing Service, equipped with standard IBM Operating System software, provides the data processing professional with an integrated time-sharing (TSO) and remote job entry capability suitable for implementing a wide range of business, data-base, management science, and engineering applications.

**Security Precautions (Facilities, User Data, System Access)**

CALL/370 and CALL/PLUS services are provided by a battery of interconnected IBM System/370 Model 158 computers located near Cleveland, Ohio. The computers and the operations staff occupy an inconspicuous, windowless structure equipped with multi-level physical security precautions, backup power, system reconfiguration features, and backup airconditioning.

System access is provided for conversational terminals at 10, 15, 30, and 120 cps, and for binary synchronous terminals at 2000 or 4800 bps. The network extends to local telephone exchanges which serve over 2500 localities across the United States, Canada, Europe and Japan. The basis for system access security is a unique identification number plus a password which the user selects and can change.

User data security is supported by a series of commands and data naming provisions that allow the user to choose, for a given set of data, what categories of security will apply. Data stored in on-line disk files is regularly backed up on a magnetic tape, which is then stored in an iron-lined tape vault equipped with sophisticated fire detection and prevention devices.





**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.420

Company Name : **STANDARD & POOR'S FIXED INCOME SYSTEMS (SPFIS)**

Headquarters Address : **100 California St. - Penthouse  
San Francisco, CA 94111**

Telephone No.: **(415) 398-4203**

**Corporate Description:**

**A division of Standard & Poor's Corporation (a financial publisher owned by McGraw-Hill Inc.) SPFIS specializes in on-line interactive systems for fixed income securities portfolio analysis and management.**

Approximate Number of Employees: **20**

Approximate Number of Users : **20**

**Corporate Officers:**

**C. James Reuter  
Anthony F. Garcia**

**General Manager  
Chairman of the Board**

### **Areas of Specialization**

**Fixed Income Asset Management and Analysis  
Investment Inventory Control  
Municipality Accounting and Reporting  
Financial Calculations  
Financial Services to Banking, Brokerage, Insurance  
Pricing matrices for municipal securities**

### **Security Precautions (Facilities, User Data, System Access)**

**Facilities: Limited access**

**User data/system access: Account/library limited access; Password protected data where required; Daily backup of all used files**

Date: **July, 1979**

Submitted By: **Bruce M. Spence**





**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.430

Company Name : **STRUCTURAL DYNAMICS RESEARCH CORPORATION**

Headquarters Address : **2000 Eastman Drive  
Milford, OH 45150**

Telephone No.: **(513) 576-2400**

**Corporate Description:**

SDRC, a privately held company, incorporated in 1967, provides solutions to engineering, design and manufacturing problems for builders and users of machinery, vehicles and other complex structural systems. Specialists in mechanical/structural vibration, failure, stress analysis and noise problems.

Approximate Number of Employees: **250**

Approximate Number of Users : **500**

**Corporate Officers:**

**J.R. Lemon  
R.F. Henke  
G.R. Vollbracht  
T.J. Woeber, Jr.  
A.F. Peter**

**Chairman of the Board  
President  
V.P. - Operations  
V.P. - Marketing  
V.P. - Computer Systems**

### **Areas of Specialization**

**TESTING SERVICES** - Specialized Instrumentation to provide stress-strain and vibration measurements which are analyzed using real time analysis and digital Fourier analysis equipment to identify and correct problems in noise, vibration, controls, dynamic failure, and fatigue life.

**COMPUTER SERVICES** - A complete library of over 70 superior, easy to use, fully documented, mechanical and structural programs offered via time-sharing and remote batch with local access via numerous computer vendors, including Control Data Corporation, General Electric Co., ComShare, Inc., Computer Sciences Corporation, and USS Engineers and Consultants, Inc.

**DESIGN SERVICES** - Integration of testing and computer resources to optimize design, improve reliability, predict performance at blueprint stage, and provide significant time and cost savings.

**EDUCATIONAL SERVICES** - Experience in providing an extensive, formal education program to assist companies add in-house capabilities and keep engineers current (since 1969, over 1000 engineers annually).

### **Security Precautions (Facilities, User Data, System Access)**

Security provisions are those of the particular commercial computer vendors used by clients to access the SDRC Mechanical Design Library Computer Programs.

Date: **July, 1979**

Submitted By: **T. J. Woeber, Jr.**



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.440

Company Name : **TEKTRONIX, INC.**

Headquarters Address : **P.O. Box 500  
Beaverton, OR 97077**

Telephone No.: **(503) 644-0161**

**Corporate Description:**

Tektronix incorporated in January 1946; is a growing company with several international subsidiaries. Tektronix is the world's leading manufacturer of cathode ray oscilloscopes, and the technological leader in graphic computer terminals.

Approximate Number of Employees: **Over 20,000**

Approximate Number of Users : **n.a.**

**Corporate Officers:**

**Howard Vollum  
Earl Wantland  
William D. Walker  
Leslie F. Stevens  
Lewis C. Kasch  
Lawrence L. Mayhew  
William J. Polits**

**Chairman of the Board  
Pres. & Chief Exec. Officer  
Exec. V.P. & Chief Oper. Officer  
Group Vice President - Finance  
Group Vice President  
Group Vice President  
Group Vice President**

### **Areas of Specialization**

Tektronix offers a full line of graphics terminals and peripherals designed specifically for remote computing. A complete library of Tektronix PLOT 10 interactive graphing software is also available.

#### **PLOT 10 INTERACTIVE GRAPHICS LIBRARY (IGL)**

IGL is the newest member of the PLOT 10 family of interactive graphics software. It supports all Tektronix 4010 and 4020 series graphics terminals as well as 4660 series plotters. Significant features are color support for the Tektronix 4027 Color graphics terminal, including polygon shading. Dynamic display manipulation and symbol selection are some other features.

#### **PLOT 10 EASY GRAPHING**

Easy Graphing is a recent member of the library of PLOT 10 interactive graphics software. PLOT 10 Easy Graphing offers presentation quality graphing to mini-computer and large systems users without programming. Easy Graphing is written in ANSI standard FORTRAN IV. The user may enter data and create graphs by means of simple command verbs used in a conversational mode. Significant features are dashed lines, shaded bars, movable legends and annotated pie charts.

### **Security Precautions (Facilities, User Data, System Access)**

Date: **July, 1979**

Submitted By: **Linda Thomas, Time Sharing Market Manager**

(503) 682-3111  
3639



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.450

Company Name : **TELENET COMMUNICATIONS CORPORATION**

Headquarters Address : **8330 Old Courthouse Road  
Vienna, VA 22180**

Telephone No.: **(703) 827-9200**

**Corporate Description:**

Telenet, a publicly held company formed in 1972, operates a packet-switched data communications network providing total coverage of the continental U.S. Through interconnection with other carriers, service is also provided to international points.

Approximate Number of Employees: **200**

Approximate Number of Users : **300 data centers**

**Corporate Officers:**

<b>Dr. Lawrence G. Roberts</b>	<b>Chairman of the Board &amp; Pres.</b>
<b>Marvin C. Moses</b>	<b>V.P. - Finance</b>
<b>Ralph R. Johnson</b>	<b>V.P. - Marketing</b>
<b>Richard C. Furnival</b>	<b>V.P. - Operations</b>
<b>Peter C. Waal</b>	<b>V.P. - Systems Development</b>

### **Areas of Specialization**

**PUBLIC NETWORK SERVICE** - Designed primarily for communications between asynchronous terminals and remote host computer systems. Typical customer applications include time-sharing, information retrieval, word processing and electronic mail. Host computers may be connected to the network through an on-site Telenet Processor or through an X.25 software interface package provided by Telenet or independent suppliers.

**PRIVATE NETWORK SYSTEMS** - General-purpose packet network system based on multi-microprocessor equipment and software developed by Telenet for its own public network. Telenet private systems may be used as stand-alone networks or in conjunction with the Telenet public network.

### **Security Precautions (Facilities, User Data, System Access)**

**FACILITIES** - The Network Control Center and Switching Centers are accessible only to authorized Telenet personnel.

**USER DATA** - n.a.

**SYSTEM ACCESS** - Optional privacy feature which restricts access to customer's computer facilities to terminal users designated by the customer.

Date: **July, 1979**

Submitted By: **Carolyn F. Morse**



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.460

Company Name : **THE UNI-COLL CORPORATION**

Headquarters Address : **3401 Science Center  
Philadelphia, PA 19104**

Telephone No.: **(215) 387-3890**

**Corporate Description:**

UNI-COLL is a for-profit corporation organized under the Business Corporation Law of the Commonwealth of Pennsylvania. Originally formed in July, 1972, the company provides computing services to some 250 industrial and commercial customers and several not-for-profit institutions in the Middle Atlantic Region.

Approximate Number of Employees: **125**

Approximate Number of Users : **600**

**Corporate Officers:**

<b>James D. Gailagher</b>	<b>President &amp; CEO</b>
<b>R. A. Aschenbrenner</b>	<b>Sr. Vice President</b>
<b>Thomas J. Unger</b>	<b>V.P. for Operations</b>
<b>David S. Workman</b>	<b>V.P. &amp; Secretary</b>

### **Areas of Specialization**

UNI-COLL is a general purpose service center supplying timesharing, batch processing, consulting, analysis, programming, data control, and data preparation support to its clients on an as-needed basis.

UNI-COLL software libraries support engineering, scientific, statistical, simulation, modeling, business, economic forecasting, data base and data communications applications. Software libraries are augmented by extensive utility packages.

### **Security Precautions (Facilities, User Data, System Access)**

The UNI-COLL GUARD data security system is a powerful system for preserving the integrity and security of disk resident data sets. GUARD is a functional enhancement to the UNI-COLL system control program, operates with minimal system overhead, and is designed to provide an access monitor that imposes on its users only those restrictions that are warranted by the sensitivity of their data.

GUARD determines that access activity is permitted from user defined authorizations. If no explicit action is taken to define access authorizations for a data set, the user, in effect, determines that security is not required. The access authorizations of Read and Write are automatically assigned if the user does not specify other alternatives. This default is used to ensure that no method exists for bypassing the GUARD access monitor that is invoked every time a user creates or attempts to access disk resident data sets.

GUARD is a flexible and powerful data security system. With GUARD, both the individual user and the large organization can determine and maintain security measures that will best meet their specific security and privacy requirements.

Date: **July, 1979**

Submitted By: **Jeffrey D. Bailing, Sales Manager**



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.470

Company Name : **UNITED COMPUTING SYSTEMS, INC.**

Headquarters Address : **2525 Washington  
Kansas City, MO 64108**

Telephone No.: **(816) 221-9700**

**Corporate Description:**

United Computing Systems was founded in 1967 as a subsidiary of United Telecommunications, the second largest independent telephone company. United Telecom's total assets are over 2½ billion dollars. UCS data center operations are in Kansas City, Boston, and London.

Approximate Number of Employees: **1,300**

Approximate Number of Users : **15,000**

**Corporate Officers:**

<b>G. Jack Lorenz</b>	<b>President</b>
<b>Jerry D. Howard</b>	<b>Exec. V.P., Tech. Div.</b>
<b>G. Paul Distefano</b>	<b>Exec. V.P., NIS Div.</b>
<b>F. Clark Ellis</b>	<b>V.P., Treas., &amp; Sec.</b>
<b>A. L. Howard</b>	<b>V.P., NIS Sales</b>
<b>William Rooney</b>	<b>V.P., NIS Sales</b>
<b>J. C. Accardi</b>	<b>V.P., Marketing Operations</b>
<b>Thomas L. Pool</b>	<b>V.P., Comm. Operations</b>
<b>Walter G. Cleveland</b>	<b>V.P., Bus. Info. Products</b>

### **Areas of Specialization**

**ENGINEERING** - United Computing has an extensive library of engineering packages that includes financial packages for engineering management, design packages for chemical, mechanical, structural, and electrical engineers, CPM and PERT programs, and many mathematical and statistical packages.

**DATA BASE MANAGEMENT** - United Computing offers a complete line of Data Base packages designed to satisfy a broad range of needs.

**BUSINESS/FINANCIAL** - United Computing has an extensive collection of analysis and forecasting tools for business and financial purposes, and general accounting systems.

**GENERAL REMOTE-COMPUTING** - Utilizing a Cray-1 computer and Control Data 170 series and 6000 series computers, United Computing offers a large resource of computer power from its central data center. Files are common between systems and an extensive communications network allows toll-free access from over 200 cities in the U.S., U.K., and Europe via low and high speed terminals.

The addition of London University Computing Services, International Timesharing, and Standard Information Systems in 1977 have further expanded UCS services in the areas of engineering, business accounting, and investment services. The acquisition of the Calma Company in 1978 has expanded UCS service offerings in engineering design and graphics.

### **Security Precautions (Facilities, User Data, System Access)**

High level security is rigidly maintained in United Computing's national datacenter. The heart of the security systems includes a five-level card-key system, an alarm system on all exterior doors not controlled by card keys, and a closed circuit TV monitoring system. Both the alarm system and the closed circuit TV system are monitored 24 hours a day by security officers.

To ensure the hardware will not be damaged because of power fluctuations, United Computing has installed a 700 kilowatt Uninterrupted Power Supply (UPS) that supplies back-up power to the Datacenter. If significant power deviation occurs, the system automatically switches to the UPS.

The user is provided with three levels of passwords to prevent unauthorized access to his data files and programs. To ensure that all disk files can be recovered should they ever be destroyed for any reason, United Computing daily copies to tape all disk files that have changed that day. Twice monthly United Computing transfers all disk files to tape. On demand, any file can be reloaded within 24 hours.

Date: **July, 1979**

Submitted By: **Glenn Hitchcock, Manager, Product Marketing**



**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.480

Company Name : **UNIVERSITY COMPUTING COMPANY**

Headquarters Address : **8303 Elmbrook Drive  
Dallas, TX 75247**

Telephone No.: **(214) 688-7100**

**Corporate Description:**

**University Computing Company is an international data processing services and software company specializing in remote access computing services and financial/banking and system software.**

**Corporate Officers:**

**John Kason  
Garlan Braithwaite**

**President  
V.P., Finance & Treas.**

Approximate Number of Employees: **1,800**

Approximate Number of Users : **in excess of 5,000**

### **Areas of Specialization**

**UCC Domestic is divided into two (2) separate divisions: Computing Services and Software, with corporate offices in Dallas and field offices in eighteen (18) cities in the United States, plus UCC Canada, Ltd. in Toronto.**

**The Computing Services Division provides the foundation of UCC's domestic computing operations through a network of communications facilities nationwide, connecting the user to one of the largest Univac, CDC, and IBM computer installations in the world. UCC's major customers include civil, structural, electronic, nuclear and petroleum engineering and manufacturing based companies needing large-scale general computing services.**

**The Software Division specializes in software for the commercial banking/thrift community and software packages that provide enhanced capabilities in an IBM operating environment. The packages available address all aspects of financial control and management, commercial and installment lending, information capture and reporting; other packages offered are Tape Management System (UCC 1), DOS/OS Conversion (UCC 2), Disk Management System (UCC 3), PDS Space Manager (UCC 6), Automated Production Control (UCC 7), Data Dictionary/Manager (UCC 10), Job Recovery Management (UCC 15), plus a series of systems aid packages (Mail Order Products).**

### **Security Precautions (Facilities, User Data, System Access)**

**University Computing Company provides physical security at its national data center by maintaining a policy of limited access to the center, combined with a 24-hour-a-day guard service. In addition, the actual computer rooms have restricted access as well as TV monitoring of main entrances. Protection of user stored data is of prime importance and concern to UCC. Accordingly, UCC has installed an elaborate security system consisting of account number and password restriction, preventing unauthorized remote terminals from accessing its systems. Furthermore, all on-line mass storage files are provided with varying degrees of user selectable protection including such features as account number protection, password protection, site code restriction, cyphering, etc. UCC provides a daily back-up of all on-line mass storage files that have been changed during the current day. In addition, on a weekly basis, all on-line mass storage files are backed-up. These back-ups are maintained for a full thirty day cycle.**

Date: **July, 1979**

Submitted By: **Charles R. Shelton, Marketing Manager**





**COMPANY  
DIRECTORY**

## **Company Profile and Security Precautions**

A.490

Company Name : **WARNER COMPUTER SYSTEMS, INC.**

Headquarters Address : **605 Third Avenue  
New York, NY 10016**

Telephone No.: **(212) 697-0110**

**Corporate Description:**

Warner Computer Systems, Inc. is a privately held corporation in business since 1971. Both its sales and earnings have doubled every year since its inception.

Approximate Number of Employees: **55**

Approximate Number of Users : **300**

**Corporate Officers:**

<b>Harvey Krieger</b>	<b>President</b>
<b>Ben Adenbaum</b>	<b>Vice President</b>
<b>Hellmut Hameyer</b>	<b>Vice President</b>
<b>Alan Krieger</b>	<b>Vice President</b>
<b>Gerald Krieger</b>	<b>Vice President</b>

### **Areas of Specialization**

Warner Computer Systems, Inc. offers a full range of time-sharing, remote batch and batch services.

The following languages are supported on our system: Basic, Extended Fortran IV, ANS Cobol and APL.

We also offer several data base systems, a financial modeling system, statistical and graphics packages, a complete insurance system (assigned risk), a stock market historical data base system, estate planning system, credit verification system, and inventory system, among others.

Our service is available 24 hours per day, with complete computer and communications redundancy. You can communicate with our system via 10, 15, 30 and 120 cps terminals and all 2780, 3780 and HASP compatible RJE terminals. Complete programming and consulting services are offered.

Our client base consists exclusively of Fortune 1000 companies, public utilities, major banks, insurance companies, financial institutions and universities.

### **Security Precautions (Facilities, User Data, System Access)**

Our Data Center is staffed 24 hours per day, 7 days per week. No one is permitted in the center unless authorized by our Vice President of Operations.

Fire alarms, smoke and heat detection alarms are installed. A complete Halon system is also installed.

Files in a user account cannot be accessed by another account unless specifically authorized by the first user.

Tapes are stored on-site in a fire-retardant vault and complete back-up tapes are stored at a remote facility.

User codes are established by each user. In addition, nonprintable passwords are established by each user (and are, of course, known only to that user), and can be changed at any time.

Date: **July, 1979**

Submitted By: **Alan Krieger, Vice President - Marketing**





## MAJOR METROPOLITAN AREAS IN THE U.S. AND CANADA\*

	Companies & Personnel Page	Toll-Free Reference Chart Page		Companies & Personnel Page	Toll-Free Reference Chart Page
Akron, OH.....	XX.001	XX.073	Montreal, QUE.....	XX.030	XX.087
Albany-Schenectady-Troy, NY.....	XX.001	XX.073	Nashville-Davidson, TN.....	XX.031	XX.088
Allentown-Bethlehem-Easton, PA-NJ.....	XX.001	XX.073	Nassau-Suffolk, NY.....	XX.031	XX.088
Anaheim-Santa Ana-Garden Grove, CA.....	XX.001	XX.074	New Brunswick/Perth Amboy-Sayreville, NJ.....	XX.032	XX.088
Atlanta, GA.....	XX.002	XX.074	New Orleans, LA.....	XX.032	XX.089
Baltimore, MD.....	XX.003	XX.074	New York, NY-NJ.....	XX.032	XX.089
Birmingham, AL.....	XX.004	XX.075	Newark, NJ.....	XX.037	XX.090
Boston, MA.....	XX.004	XX.075	Norfolk/VA Beach-Portsmouth, VA-NC.....	XX.038	XX.090
Buffalo, NY.....	XX.007	XX.076	Northeast, PA.....	XX.039	XX.090
Charlotte-Gastonia, NC.....	XX.008	XX.076	Oklahoma City, OK.....	XX.039	XX.091
Chicago, IL.....	XX.008	XX.076	Omaha, NE-IA.....	XX.039	XX.091
Cincinnati, OH-KY-IN.....	XX.010	XX.077	Orlando, FL.....	XX.040	XX.091
Cleveland, OH.....	XX.010	XX.077	Ottawa, ONT.....	XX.040	XX.092
Columbus, OH.....	XX.012	XX.078	Philadelphia, PA-NJ.....	XX.040	XX.092
Dallas-Ft. Worth, TX.....	XX.012	XX.078	Phoenix, AZ.....	XX.043	XX.093
Dayton, OH.....	XX.014	XX.079	Pittsburgh, PA.....	XX.044	XX.093
Denver-Boulder, CO.....	XX.014	XX.079	Portland, OR-WA.....	XX.045	XX.093
Detroit, MI.....	XX.016	XX.079	Providence-Warwick/Pawtucket, RI-MA.....	XX.045	XX.094
Edmonton, Alberta.....	XX.017	XX.080	Richmond, VA.....	XX.046	XX.094
Flint, MI.....		XX.080	Riverside-San Bernardino-Ontario, CA.....	XX.046	XX.095
Fort Lauderdale-Hollywood, FL.....	XX.018	XX.081	Rochester, NY.....	XX.046	XX.095
Gary-Hammond-East Chicago, IN.....		XX.081	Sacramento, CA.....	XX.047	XX.095
Grand Rapids, MI.....	XX.018	XX.081	St. Louis, MO-IL.....	XX.048	XX.096
Greensboro-Winston-Salem-High Point, NC.....	XX.018	XX.081	Salt Lake City, UT.....	XX.048	XX.096
Greenville-Spartanburg, SC.....	XX.019	XX.082	San Antonio, TX.....	XX.049	XX.096
Hamilton, ONT.....		XX.082	San Diego, CA.....	XX.049	XX.097
Hartford, CT.....	XX.019	XX.082	San Francisco-Oakland, CA.....	XX.050	XX.097
Honolulu, HI.....	XX.021	XX.083	San Jose, CA.....	XX.052	XX.098
Houston, TX.....	XX.022	XX.083	Seattle-Everett, WA.....	XX.052	XX.098
Indianapolis, IN.....	XX.023	XX.083	Springfield-Chicopee-Holyoke, MA-CT.....		XX.099
Jacksonville, FL.....	XX.023	XX.084	Syracuse, NY.....	XX.053	XX.099
Jersey City, NJ.....	XX.024	XX.084	Tampa-St. Petersburg, FL.....	XX.054	XX.099
Kansas City, MO-KS.....	XX.024	XX.084	Toledo, OH-MI.....	XX.054	XX.100
Los Angeles-Long Beach, CA.....	XX.025	XX.085	Toronto, ONT.....	XX.055	XX.100
Louisville, KY-IN.....	XX.027	XX.085	Tulsa, OK.....	XX.056	XX.100
Memphis, TN-AR-MS.....	XX.027	XX.086	Vancouver, BC.....	XX.056	XX.101
Miami, FL.....	XX.028	XX.086	Washington, DC.....	XX.057	XX.101
Milwaukee, WI.....	XX.028	XX.087	Wilmington, DE-NJ-MD.....		XX.102
Minneapolis-St. Paul, MN-WI.....	XX.029	XX.087	Winnipeg, MAN.....	XX.060	XX.102
			Youngstown-Warren, OH.....		XX.102

\* Shown here are the 72 "Standard Metropolitan Statistical Areas" defined by the U.S. Bureau of Census with populations in excess of 500,000, and the 7 major areas in Canada with similar populations.

## OTHER AREAS & OVERSEAS LOCATIONS

Alaska.....	XX.060	XX.103	Mexico.....	XX.065	XX.106
Australia.....	XX.061	XX.103	Netherlands.....	XX.066	XX.106
Austria.....	XX.061	XX.103	Norway.....	XX.066	XX.106
Belgium.....	XX.062	XX.103	Philippines.....		XX.106
Denmark.....	XX.062	XX.103	Puerto Rico.....	XX.067	XX.106
Finland.....	XX.063	XX.104	Scotland.....		XX.107
France.....	XX.063	XX.104	Singapore.....		XX.107
Germany.....	XX.064	XX.104	South Africa.....		XX.107
Hong Kong.....		XX.105	Spain.....	XX.067	XX.107
Ireland.....	XX.064	XX.105	Sweden.....	XX.068	XX.107
Israel.....		XX.105	Switzerland.....	XX.068	XX.107
Italy.....	XX.065	XX.105	UK.....	XX.069	XX.107
Japan.....	XX.065	XX.106	Venezuela.....	XX.072	XX.108



**Albany,  
Schenectady,  
Troy, NY**

► GENERAL ELECTRIC INFORMATION SERVICES CO.

**Address:** Schenectady Branch  
Commercial Branch  
Engineering Services Branch  
Industrial Branch  
650 Franklin Street, 3rd Floor  
Schenectady, NY 12305  
**Telephone:** (518) 385-7720

**Local Contact:** Branch Manager

**Services Offered:** A full service branch office.

► HONEYWELL DATANETWORK

**Address:** Pine West Park  
Washington Ave.  
Albany, NY 12205

**Telephone:** (518) 456-7000

**Local Contact:** J. J. Marino  
Branch Marketing Manager

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline

**Allentown,  
Bethlehem,  
Easton, PA NJ**

► HONEYWELL DATANETWORK

**Address:** Suite 203  
1405 Cedar Crest Blvd.  
Allentown, PA 18104

**Telephone:** (215) 434-4244

**Local Contact:** D. Stengle  
Branch Marketing Manager

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► PENTAMATION ENTERPRISES, INC.

**Address:** One Bethlehem Plaza  
Bethlehem, PA 18018

**Telephone:** (215) 691-3616

**Local Contact:** Stephen J. Duga  
Mgr. Remote Computing Services

**Services Offered:** A National CSS agency field office, providing technical support, customer education and solution selling for all types of remote computer users.

**Atlanta, GA**

► **BOEING COMPUTER SERVICES COMPANY**

**Address:** Branch Office  
6855 Jimmy Carter Blvd.  
Norcross, GA 30071

**Telephone:** 404-449-6515

**Local Contact:** Robert Clevenger -- Branch Manager

**Services Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering consulting; education & training; facilities mgmt; data base mgmt.; both custom & packaged programs.

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 205  
6666 Powers Ferry Road  
Atlanta, Georgia 30339

**Telephone:** (404) 955-1464

**Local Contact:** Carl Jackson  
District Manager

**Services Offered:** Full remote computing service, line printer, desktop plotter, consulting and applications programming are available from this office.

► **COMPUTER USAGE COMPANY**

**Address:** Atlanta Branch Office  
6433 Warren Drive  
Norcross, GA 30071

**Telephone:** (404) 449-8310

**Local Contact:** Dean Morgan  
Director Marketing Support

**Services Offered:** A full service branch office offering APL time sharing, remote batch access, WYLBUR, card reader and printer on-site, customer training and seminars, applications consulting, technical support, and marketing services.

► **DIGITAL COMMUNICATIONS ASSOCIATES, INC.**

**Address:** 135 Technology Park/Atlanta  
Norcross, GA 30092

**Telephone:** (404) 448-1400

**Local Contact:** William L. Goldstein  
Vice President Marketing/Sales

**Services Offered:** Highly responsive, application-independent, data-transport networks for terminal-to-computer communications.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Atlanta District  
Commercial Branch  
Financial Branch  
2200 Century Parkway NE  
Suite 270  
**Telephone:** Atlanta, GA 30345  
(404) 325-9889

**Local Contact:** Branch Manager

**Services Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** P.O. Box 29725 Zip 30359  
6 West Druid Hills Dr. NE  
Atlanta, GA 30329

**Telephone:** (404) 321-2000

**Local Contact:** S. Mathews  
Branch Manager, DPO Atlanta Branch,  
Suite 240

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **I.P. SHARP ASSOCIATES, INC.**

**Address:** 5000 Snapfinger Woods Dr.,  
Decatur, Georgia 30035

**Telephone:** (404) 987-2301

**Local Contact:** Andrew K. Dickey  
Branch Manager

**Services Offered:** Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.



► MARTIN MARIETTA DATA SYSTEMS

Address: Martin Marietta Data Systems  
Three Piedmont Center  
Suite 303  
Atlanta, Georgia 30305

Telephone: (404) 261-0641

Local  
Contact: Alan Sleeper,  
District Manager

Services  
Offered: A full-service branch office, offering  
remote computing, consulting services,  
remote batch facilities.

► ON-LINE SYSTEMS, INC.

Address: Atlanta Branch Office  
6666 Powers Ferry Road  
Atlanta, GA 30339

Telephone: (404) 955-1153

Local  
Contact: Branch Manager

Services  
Offered: A full-service branch office of the OLS  
computer services network, offering  
local dial up and sales and technical  
support.

► RAPIDATA, INC.

Address: District Sales Office  
225 Peachtree Street, N.E.  
Suite 1710  
Atlanta, Georgia 30303

Telephone: (404) 522-1750

Local  
Contact: Thomas Marcopulos  
District Sales Manager  
A full service district sales office pro-  
viding on line solutions in the manage-  
ment and financial information system  
areas on timesharing and mini computers.  
Graphics, remote computing, financial  
data bases, M.I.S. consulting services,  
customer training and industry seminars.

► UNITED COMPUTING SYSTEMS, INC.

Address: Building 1, Suite 106  
5825 Glenridge Drive N.E.  
Atlanta, GA 30328

Telephone: (404) 256-3610

Local  
Contact: Bob Rohr  
Branch Manager

Services  
Offered: A full-service office, offering remote  
computing and consulting services.

**Baltimore, MD**

► GENERAL ELECTRIC INFORMATION SERVICES CO.

Address: Baltimore Branch  
36 South Charles Street  
Suite 1812  
Baltimore, MD 21201

Telephone: (301) 539-6770

Local  
Contact: Branch Manager

Services  
Offered: A full service branch office.

► HONEYWELL DATANETWORK

Address: 1306 Bellona Avenue  
Lutherville, MD 21093

Telephone: (301) 828-0900

Local  
Contact: B. Haughton  
Marketing Manager

Services  
Offered: Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.



**Birmingham, AL**

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Birmingham Branch  
#2 Metroplex Drive  
Suite 212  
Birmingham, AL 35209

**Telephone:** (205) 879-2030

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **MARTIN MARIETTA DATA SYSTEMS**

**Address:** Martin Marietta Data Systems  
300 East Joppa Road  
Baltimore, Maryland 21204

**Telephone:** (301) 321-5700

**Local  
Contact:** Rick Aldridge  
RCS District Manager

**Services  
Offered:** A full-service office, offering remote  
computing, consulting services, remote  
batch facilities.

► **AVCO COMPUTER SERVICES**

**Address:** 3322 Memorial Parkway, S. W., Suite 31  
Huntsville, Alabama 35801

**Telephone:** (205) 883-1631

**Local  
Contact:** William J. Guillorn

**Services  
Offered:** Timesharing and remote batch processing on  
IBM equipment. CRT and drum plotting capa-  
bility. Applications software to satisfy business,  
engineering, scientific and statistical require-  
ments. Custom software engineering.

► **HONEYWELL DATANETWORK**

**Address:** Suite 210, 3918 Montclair Rd.  
Birmingham, AL 35213

**Telephone:** (205) 323-2431

**Local  
Contact:** M. B. Jeffcoat  
Res. Marketing Manager

**Services  
Offered:** Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.

**Boston, MA**

► **ADP NETWORK SERVICES, INC.**

**Address:** 40 Second Avenue  
Waltham, Massachusetts 02154

**Telephone:** (617) 890-6701

**Local  
Contact:** Gary Schmidt  
Division Manager

**Services  
Offered:** Full remote computing service, line  
printer, multicolor pen plotter, con-  
sulting and applications programming,  
weekly client training classes, and  
duty programmer are available from  
this office.

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 1000  
44 School Street  
Boston, Massachusetts 02108

**Telephone:** (617) 227-8700

**Local  
Contact:** Drew Hannah  
District Manager

**Services  
Offered:** Full remote computing service, line printer, multicolor pen plotter, consulting and applications programming, weekly client training classes and duty programmer are available.

► **AVCO COMPUTER SERVICES**

**Address:** 201 Lowell Street  
Wilmington, Massachusetts 01887

**Telephone:** (617) 729-7700

**Local  
Contact:** Edwin A. Mercer, Jr.  
Marketing Manager

**Services  
Offered:** Timesharing and remote batch processing on IBM equipment. CRT and drum plotting capability. Applications software to satisfy business engineering, scientific and statistical requirements. Custom software engineering.

► **BOEING COMPUTER SERVICES COMPANY**

**Address:** Branch Office  
Wellesley Office Park  
40 William Street  
Wellesley, MA 02181

**Telephone:** 617-237-9814

**Local  
Contact:** Don Asarnow -- Branch Manager

**Services  
Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► **CALLDATA SYSTEM, INC.**

**Address:** 100 Summer St.  
Boston, MA 02110

**Telephone:** (617) 423-6780

**Local  
Contact:** Al Droge  
District Sales Manager

**Services  
Offered:** A full-service district office offering local and remote computing, interactive and batch terminals, technical support and consulting services.

► **CAMBRIDGE COMPUTER ASSOCIATES, INC. (CCA)**

**Address:** 222 Alewife Brook Parkway  
Cambridge, MA 02138

**Telephone:** (617) 868-1111

**Local  
Contact:** Walter Hodge  
Dir. of Marketing

**Services  
Offered:** CCA offers applications software to management, for installed use (IBM or compatible) or via time-sharing in U.S. & Europe. Packages: CROSSTABS (management statistics), AUTOGRAF (graphic reports), UTILITY-CODER (file/data handling and reporting).

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Boston District  
Financial/Commercial Branch  
Industrial Branch  
1 Federal Street  
16th Floor  
Boston, MA 02110

**Telephone:** (617) 482-9410

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** 405 Grove Street  
Worcester, MA 01605

**Telephone:** (617) 799-4132

**Local  
Contact:** M. F. McDermott  
Branch Marketing Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **HONEYWELL DATANETWORK**

**Address:** Info Systems  
70 Walnut Street  
Wellesley Hills, MA 02181

**Telephone:** (617) 237-4115

**Local  
Contact:** A. Bianco  
Branch Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.



► **INTERACTIVE DATA CORPORATION**

**Address:** 486 Totten Pond Road  
Waltham, Ma. 02154

**Telephone:** (617) 890-1234

**Local Contact:** Manager of Product Development

**Services Offered:** Time sharing, remote computing, data base accessing, graphics, customer training and consulting, and remote job entry facilities.

► **I.P. SHARP ASSOCIATES, INC.**

**Address:** Suite 415,  
148 State Street,  
Boston, Mass. 02109

**Telephone:** (617) 523-2506

**Local Contact:** Ashok Kondapi  
Branch Manager

**Services Offered:** Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.

► **LUPFER AND LONG, INCORPORATED**

**Address:** Corporate Headquarters  
Box A-57  
Hanover, New Hampshire 03755

**Telephone:** (603) 643-4503

**Local Contact:** Christine W. Thompson  
Marketing Manager

**Services Offered:** Specializing in software products and consulting services for the interactive and remote computing markets. Products available through national time-sharing vendors or for use on in-house minis or main frames.

► **ON-LINE SYSTEMS, INC.**

**Address:** Boston Branch Office  
40 Washington Street  
Wellesley, MA 02181

**Telephone:** (617) 237-5070

**Local Contact:** Branch Manager

**Services Offered:** A full-service branch office of the OLS computer services network, offering local dial up and sales and technical support.

► **RAPIDATA, INC.**

**Address:** District Sales Office  
21 Merchants Row  
Boston, Massachusetts 02109

**Telephone:** (617) 227-4554

**Local Contact:** William Joyce  
District Sales Manager

**Services Offered:** A full service district sales office providing on line solutions in the management and financial information system areas on timesharing and mini computers. Graphics, remote computing, financial data bases, M.I.S. consulting services, customer training and industry seminars.

► **SCIENTIFIC TIME SHARING CORPORATION**

**Address:** Boston Branch Office  
462 Boylston Street, Suite 305  
Boston, Massachusetts 02116

**Telephone:** (617) 267-6864

**Local Contact:** Joel E. Berman  
Branch Manager

**Services Offered:** Full-service branch office, offering remote access service, customer training and seminars, applications consulting and technical support, programming and market services.

► **SCIENTIFIC TIME SHARING CORPORATION**

**Address:** Manufacturing Services Office  
462 Boylston Street, Suite 305  
Boston, Massachusetts 02116

**Telephone:** (617) 267-6864

**Local Contact:** John Estep

**Services Offered:** Specialized branch offering management consulting and computer services in the areas of forecasting, inventory management, production scheduling, MRP, shop floor control and distribution.

► **SUN INFORMATION SERVICES COMPANY**

**Address:** Branch Office  
100 Summer St., Suite 3102  
Boston, MA 02110

**Telephone:** (617) 542-1207

**Local Contact:** N.T. Gleason  
Branch Manager

**Services Offered:** A full-service branch office, offering remote and interactive computing, consulting services remote batch facilities, and rental of computer terminal equipment.



► UNITED COMPUTING SYSTEMS, INC.

Address: 36 Washington Street  
Wellesley Hills, Mass. 02181

Telephone: (617) 237-2910

Local  
Contact: Ted Osetek  
Regional Manager

Services  
Offered: A full-service office, offering remote  
computing and consulting services.

► UNIVERSITY COMPUTING COMPANY

Address: 440 Totten Pond Road  
Waltham, MA 02154

Telephone: (617) 890-3282

Local  
Contact: Tom Werner  
Sales Representative

Services  
Offered: A full-service sales office offering  
remote computing service, card reader  
and high speed printer for on-site  
processing and customer support.

**Buffalo, NY**

► ADP NETWORK SERVICES, INC.

Address: 5500 Main Street  
Williamsville, New York 14221

Telephone: (716) 631-5500

Local  
Contact: Tom Dingman  
Office Manager

Services  
Offered: Full remote computing service, con-  
sulting and applications programming  
are available from this office.

► GENERAL ELECTRIC INFORMATION SERVICES CO.

Address: Buffalo Branch  
5500 Main Street, Suite 310  
Williamsville, NY 14221

Telephone: (716) 632-3522

Local  
Contact: Branch Manager

Services  
Offered: A full service branch office.

► HONEYWELL DATANETWORK

Address: Buffalo Branch  
4355 Ridge Lea Road  
Amherst, NY 14226

Telephone: (716) 835-2770

Local  
Contact: J. A. Cravotta  
Branch Marketing Manager

Services  
Offered: Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.

► ON-LINE SYSTEMS, INC.

Address: Buffalo Branch Office  
5500 Main Street  
Williamsville, NY 14221

Telephone: (716) 631-3530

Local  
Contact: Branch Manager

Services  
Offered: A full-service branch office of the OLS  
computer services network, offering  
local dial up and sales and technical  
support.

**Charlotte,  
Gastonia, NC**

▶ **HONEYWELL DATANETWORK**

Address: 645 O Pressley Road  
Charlotte, NC 28210

Telephone: (704) 523-7361

Local Contact: A. E. Stone  
Manager

Services Offered: Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

▶ **GENERAL ELECTRIC INFORMATION SERVICES CO.**

Address: Charlotte District/Branch  
Cameron Brown Building  
301 S. McDowell Street  
Charlotte, NC 28204

Telephone: (704) 374-1783

Local Contact: Branch Manager

Services Offered: A full service branch office.

▶ **UNITED COMPUTING SYSTEMS, INC.**

Address: Suite 227  
4530 Park Road  
Charlotte, N.C. 28209

Telephone: (704) 523-8991

Local Contact: John Dowis  
Sales Representative

Services Offered: A full-service office, offering remote computing and consulting services.

**Chicago, IL**

▶ **ADP NETWORK SERVICES, INC.**

Address: Suite 1940  
100 South Wacker Drive  
Chicago, Illinois 60606

Telephone: (312) 346-1044

Local Contact: Rod Belle  
District Manager

Services Offered: Full remote computing service, line printer, desktop plotter, card reader, consulting and applications programming are available from this office.

▶ **BOEING COMPUTER SERVICES COMPANY**

Address: Branch Office  
35 East Wacker  
Chicago, Illinois 60601

Telephone: 312-781-7900

Local Contact: Robert C. Middleton -- Branch Manager

Services Offered: Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting, education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

▶ **CALldata SYSTEMS, INC.**

Address: 2400 East Devon Ave,  
Des Plaines, IL 60018

Telephone: (312) 296-4770

Local Contact: Randy Johnson  
District Sales Manager

Services Offered: A full-service district office offering local and remote computing, interactive and batch terminals, technical support and consulting services.



► GENERAL ELECTRIC INFORMATION SERVICES CO.

Address: Chicago Commercial Branch  
233 South Wacker Drive  
Sears Tower  
Suite 5230  
Chicago, IL 60606  
Telephone: (312) 781-7840

Local  
Contact: Branch Manager

Services Offered: A full service branch office.

► HONEYWELL DATANETWORK

Address: 120 So. Riverside Plaza  
Chicago, IL 60606

Telephone: (312) 648-5000

Local  
Contact: J. D. Borgman  
Branch Manager

Services Offered: Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► I.P. SHARP ASSOCIATES, INC.

Address: Suite 1746,  
2 North Riverside Plaza,  
Chicago, Illinois 60606

Telephone: (312) 648-1730

Local  
Contact: James Royer  
Branch Manager

Services Offered: Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.

► MARTIN MARIETTA DATA SYSTEMS

Address: Martin Marietta Data Systems  
2340 South Arlington Heights Road  
Suite 640  
Arlington Heights, Illinois 60005

Telephone: (312) 364-8111

Local  
Contact: Roger C. Smith  
District Manager

Services Offered: A full-service office, offering remote computing, consulting services, remote batch facilities.

► NATIONAL COMPUTER NETWORK OF CHICAGO

Address: 1929 North Harlem Avenue  
Chicago, Illinois 60635

Telephone: (312) 622-6666

Local  
Contact: James A. Leopold  
President

Services Offered: General time-sharing programming/analyst technical assistance, software development, stock option data base, commodity data base, microprocessor assemblers/simulators.

► ON-LINE SYSTEMS, INC.

Address: Chicago Branch Office  
230 W. Monroe Street  
Chicago, IL 60606

Telephone: (312) 782-2000

Local  
Contact: Branch Manager

Services Offered: A full-service branch office of the OLS computer services network, offering local dial up and sales and technical support.

► RAPIDATA, INC.

Address: District Sales Office  
230 West Monroe Street, Suite 2246  
Chicago, Illinois 60606

Telephone: (312) 782-9588

Local  
Contact: Gary Freigo  
District Sales Manager

A full service district sales office providing on line solutions in the management and financial information system areas on timesharing and mini computers. Graphics, remote computing, financial data bases, M.I.S. consulting services, customer training and industry seminars.

► SCIENTIFIC TIME SHARING CORPORATION

Address: Chicago Branch Office  
1550 Spring Road  
Oak Brook, Illinois 60521

Telephone: (312) 530-7600

Local  
Contact: Jak Eskinazi

Services Offered: Full-service branch office, offering remote access service, customer training and seminars, applications consulting and technical support, programming and market services.



► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** Suite 1016  
150 North Wacker Drive  
Chicago, Ill. 60606

**Telephone:** (312) 782-0865

**Local  
Contact:** Michael Sonaco  
District Manager

**Services  
Offered:** A full-service office, offering remote  
computing and consulting services.

► **UNIVERSITY COMPUTING COMPANY**

**Address:** 120 South Riverside Plaza  
15th Floor  
Chicago, IL 60606

**Telephone:** (312) 368-0995

**Local  
Contact:** Dave Auer  
Midwest Regional Manager

**Services  
Offered:** A full-service sales office offering  
remote computing service, card reader  
and high-speed printer for on-site  
processing and technical support.

**Cincinnati, OH KY IN**

► **ADP NETWORK SERVICES, INC.**

**Address:** 1425 East McMillan  
Cincinnati, Ohio 45206

**Telephone:** (513) 961-5400

**Local  
Contact:** Gerry Schick  
Office Manager

**Services  
Offered:** Full remote computing service, line  
printer, card reader, consulting  
and applications programming are  
available from this office.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Ohio District/Branch  
580 Walnut Street  
Suite 140  
Cincinnati, OH 45202

**Telephone:** (513) 559-3660

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** P.O. Box 37803 Roselawn Station  
19 Knollcrest Drive  
Cincinnati, OH 45237

**Telephone:** (513) 948-4100

**Local  
Contact:** K. R. Berichon  
National Account Manager G E

**Services  
Offered:** Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.

**Cleveland, OH**

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 325  
1801 East Ninth Street  
Cleveland, Ohio 44114

**Telephone:** (216) 579-1125

**Local  
Contact:** Mike Cavotta  
District Manager

**Services  
Offered:** Full remote computing service, line  
printer, card reader, consulting and  
applications programming are avail-  
able from this office.

► **BOEING COMPUTER SERVICES COMPANY**

Address: Branch Office  
Tower East, Suite 330  
20600 Chagrin  
Cleveland, Ohio 44122

Telephone: (216) 921-0800

Local Contact: Gene Basile -- Branch Manager

Services Offered: Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

Address: Cleveland Branch  
1000 Lakeside Avenue NE  
Cleveland, OH 44114

Telephone: (216) 523-6251

Local Contact: Branch Manager

Services Offered: A full service branch office.

► **HONEYWELL DATANETWORK**

Address: 1001 East 55th Street  
Cleveland, OH 44103

Telephone: (216) 361-7011

Local Contact: J. A. Lundstrom  
Branch Manager

Services Offered: Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **IDC/CHASE ECONOMETRICS**

Address: Branch Office  
1300 East Ninth Street - Suite 1414  
Cleveland, Ohio 44114

Telephone: (216) 771-0700

Local Contact: William D. Gela  
Branch Manager

Services Offered: A full-service branch office; offering remote computing; consulting services in financial, economic, and corporate planning systems; line printer; plotter; remote job entry; and client education.

► **MARTIN MARIETTA DATA SYSTEMS**

Address: Martin Marietta Data Systems  
The Illuminating Building  
55 Public Square  
Suite 1400  
Cleveland, Ohio 44113

Telephone: (216) 687-0310

Local Contact: James Payne  
RCS Sales

Services Offered: A full-service office, offering remote computing, consulting services, remote batch facilities.

► **ON-LINE SYSTEMS, INC.**

Address: Cleveland Branch Office  
1468 West 9th Street  
Cleveland, OH 44113

Telephone: (216) 612-0001

Local Contact: Branch Manager

Services Offered: A full-service branch office of the OLS computer services network, offering local dial up and sales and technical support.

► **UNITED COMPUTING SYSTEMS, INC.**

Address: Suite 460  
3690 Orange Plaza  
Beachwood, Ohio 44126

Telephone: (216) 464-9205

Local Contact: Bill Price  
Branch Manager

Services Offered: A full-service office offering remote computing and consulting services.





**Columbus, OH**

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Columbus Branch  
Suite 302  
5080 Sinclair Road  
Columbus, OH 43216

**Telephone:** (614) 438-2113

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **ADP NETWORK SERVICES, INC.**

**Address:** 1631 Northwest Professional Plaza  
Columbus, Ohio 43220

**Telephone:** (614) 451-4501

**Local  
Contact:** Rod Hummel  
Marketing Representative

**Services  
Offered:** Full remote computing service, line printer, desktop plotter, paper tape reader, card reader, consulting and applications programming are available from this office.

► **HONEYWELL DATANETWORK**

**Address:** Suite 306  
1855 Fountain Square Court  
Columbus, OH 43224

**Telephone:** (614) 261-7759

**Local  
Contact:** D. J. Quick  
Branch Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** P.O. Box 781  
Delaware, Ohio 43015

**Telephone:** (614) 548-6371

**Local  
Contact:** Bill Rosebrough  
Account Manager

**Services  
Offered:** A full-service office offering remote computing and consulting services.

**Dallas,  
Ft. Worth, TX**

► **ADP NETWORK SERVICES, INC.**

**Address:** 2998 Stemmons Freeway  
Dallas, Texas 75247

**Telephone:** (214) 630-9400

**Local  
Contact:** Jim Smith  
District Manager

**Services  
Offered:** Full remote computing service, line printer, desktop plotter, card reader, consulting and applications programming are available from this office.





► **BOEING COMPUTER SERVICES COMPANY**

**Address:** Branch Office  
1111 West Mockingbird Lane  
Suite 832  
Dallas, Texas 75247

**Telephone:** (214) 630-4701

**Local Contact:** Joseph Farmer -- Branch Manager

**Services Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting, education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Energy Branch  
General Business Branch  
1341 West Mockingbird Lane  
East Tower, Suite 404  
Dallas, TX 75247

**Telephone:** (214) 631-0910

**Local Contact:** Branch Manager

**Services Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** Suite 400  
1111 West Mockingbird Lane  
Dallas, TX 75247

**Telephone:** (214) 688-7600

**Local Contact:** W. R. Moore  
Branch manager

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **I.P. SHARP ASSOCIATES, INC.**

**Address:** Suite 1148, Campbell Centre,  
8350 N. Central Expressway,  
Dallas, Texas 75206

**Telephone:** (214) 369-1131

**Local Contact:** John R. Carpenter  
Branch Manager

**Services Offered:** Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.

► **ON-LINE SYSTEMS, INC.**

**Address:** Dallas Branch Office  
2525 Stemmons Freeway  
Dallas, TX 75207

**Telephone:** (214) 634-9043

**Local Contact:** Branch Manager

**Services Offered:** A full-service branch office of the OLS computer services network, offering local dial up and sales and technical support.

► **SCIENTIFIC TIME SHARING CORPORATION**

**Address:** Dallas/Ft. Worth Branch Office  
1525 Elm Street, Suite 2110  
Dallas, Texas 75201

**Telephone:** (214) 263-4577

**Local Contact:** Vess E. Irvine  
Branch Manager

**Services Offered:** Full-service branch office, offering remote access service, customer training and seminars, applications consulting and technical support, programming and market services.

► **SUN INFORMATION SERVICES COMPANY**

**Address:** Branch Office  
Campbell Center  
8150 North Central Expressway, Mall 1  
Dallas, Tx. 75221

**Telephone:** (214) 739-9700

**Local Contact:** D.R. Edgar  
Branch Manager

**Services Offered:** A full-service branch office, offering remote and interactive computing, consulting services, remote batch facilities, and rental of computer terminal equipment.

► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** Suite 1112, Twin Towers South  
8585 Stemmons Freeway  
Dallas, Texas 75247

**Telephone:** (214) 638-8260

**Local Contact:** Tom Fore  
District Manager

**Services Offered:** A full-service office offering remote computing and consulting services.



► **UNIVERSITY COMPUTING COMPANY**

**Address:** 1930 Hi Line Drive  
Dallas, TX 75207

**Telephone:** (214) 655-8889

**Local  
Contact:** Ross Wheeler  
Vice President, Sales

**Services  
Offered:** A full-service computing site offering remote computing services, card reader, and high speed printer for on-site processing and customer support.

► **UNIVERSITY COMPUTING COMPANY**

**Address:** UCC Tower, Exchange Park  
8th Floor  
Dallas, TX 75235

**Telephone:** (214) 353-7100

**Local  
Contact:** Bill Sullivan  
Southwestern Regional Manager

**Services  
Offered:** A full-service branch office offering remote computing service, card reader and high speed printer for on-site customer support and processing.

**Dayton, OH**

► **ADP NETWORK SERVICES, INC**

**Address:** Suite 1234  
Miami Valley Tower  
Dayton, Ohio 45402

**Telephone:** (513) 228-0357

**Local  
Contact:** Dan Castleforte  
District Manager

**Services  
Offered:** Full remote computing service, line printer, desktop plotter, card reader, consulting and applications programming are available from this office.

► **AVCO COMPUTER SERVICES**

**Address:** 333 West First Street, Suite 322  
Dayton, Ohio 45402

**Telephone:** (513) 223-7235

**Local  
Contact:** Richard J. McBride

**Services  
Offered:** Timesharing and remote batch processing on IBM equipment. CRT and drum plotting capability. Applications software to satisfy business engineering, scientific and statistical requirements. Custom software engineering.

► **HONEYWELL DATANETWORK**

**Address:** 4540 Honeywell Court  
Dayton, OH 45424

**Telephone:** (513) 237-4000

**Local  
Contact:** W. L. Lothes  
Systems Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

**Denver,  
Boulder CO**

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 308  
1200 Lincoln Street  
Denver, Colorado 80203

**Telephone:** (303) 839-5836

**Local  
Contact:** Tad Shields  
District Manager

**Services  
Offered:** Full remote computing service, paper tape reader, consulting and applications programming are available from this office.

► **BOEING COMPUTER SERVICES COMPANY**

**Address:** Branch Office  
7995 East Prentice Avenue  
Building 40 East  
Englewood, Colorado 80110

**Telephone:** (303) 770-2630

**Local Contact:** Bob Barber -- Branch Manager

**Services Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► **COMPUTER RESOURCES CORPORATION**

**Address:** 5680 South Syracuse Circle  
Englewood, Colorado 80111

**Telephone:** (303) 771-8930

**Local Contact:** Michael H. Seeb, Vice President

**Services Offered:** Fully integrated on-line accounting system including payroll, A/R, A/P, project cost, and general ledger. Also, financial modeling, construction accounting, communications network, custom programming.

► **COMPUTER SHARING SERVICES, INC.**

**Address:** National Headquarters  
2498 West Second Avenue  
Denver, Colorado 80223

**Telephone:** (303) 934-2381

**Local Contact:** Lary Knox  
Acting Vice President, Marketing

**Services Offered:** A full service time sharing vendor offering remote computing, remote batch facilities, comprehensive customer support services, an extensive program library, and an international communications network.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Mountain States District  
Energy Branch  
Government/Commercial Branch  
600 South Cherry Street  
Suite 225

**Telephone:** Denver, CO 80222  
(303) 320-3189

**Local Contact:** Branch Manager

**Services Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** Suite 200  
5115 South Valley Hwy.  
Englewood, CO 80110

**Telephone:** (303) 779-6200

**Local Contact:** T. T. Lacina  
Branch Manager

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **SCIENTIFIC TIME SHARING CORPORATION**

**Address:** Denver Branch Office  
410 17th Street, Suite 1110  
Denver, Colorado 80202

**Telephone:** (303) 893-3545

**Local Contact:** Robert DeCloss  
Branch Manager

**Services Offered:** Full-service branch office, offering remote access service, customer training and seminars, applications consulting and technical support, programming and marketing services.

► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** Suite 20C  
2460 West 26th Ave.  
Denver, Colorado 80211

**Telephone:** (303) 458-8001

**Local Contact:** Pete Wagner  
Branch Manager

**Services Offered:** A full-service office offering remote computing and consulting services.



**Detroit, MI**

► ADP NETWORK SERVICES, INC.

**Address:** Suite 1430  
East Parklane Towers  
1 Parklane Boulevard  
Dearborn, Michigan 48126

**Telephone:** (313) 271-7300

**Local Contact:** Bob Nero  
Senior District Manager

**Services Offered:** Full remote computing service, line printer, desktop plotter, paper tape reader, card reader, consulting and applications programming are available from this office.

► ADP NETWORK SERVICES, INC.

**Address:** Suite 5  
1020 Long Boulevard  
Lansing, Michigan 48910

**Telephone:** (517) 694-5585

**Local Contact:** Sue Ragsdale  
Marketing Manager

**Services Offered:** Full remote computing service, consulting and applications programming are available from this office.

► BOEING COMPUTER SERVICES COMPANY

**Address:** Branch Office  
Park Lane Towers West  
Suite 430  
One Park Lane Boulevard  
Dearborn, MI 48126

**Telephone:** (313) 271-8000

**Local Contact:** Andy Hamilton -- Marketing Manager

**Services Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► GENERAL ELECTRIC INFORMATION SERVICES CO.

**Address:** Detroit District/Branch  
One Parklane Blvd.  
East Tower  
Suite 830  
Dearborn, MI 48126

**Telephone:** (313) 593-4500

**Local Contact:** Branch Manager

**Services Offered:** A full service branch office.

► HONEYWELL DATANETWORK

**Address:** 17515 W. Nine Mile Road  
Southfield, MI 48075

**Telephone:** (313) 424-3500

**Local Contact:** R. V. Schramm  
Branch Manager

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► ON-LINE SYSTEMS, INC.

**Address:** Detroit Branch Office  
Edison Plaza, Suite 2350  
660 Jones Street  
Detroit, MI 48226

**Telephone:** (313) 961-1300

**Local Contact:** Branch Manager

**Services Offered:** A full-service branch office of the OLS computer services network, offering local dial up and sales and technical support.

► RAPIDATA, INC.

**Address:** District Sales Office  
3000 Town Center, Suite 1990  
Southfield, Michigan 48075

**Telephone:** (313) 354-2200

**Local Contact:** Carl Steinberg  
District Sales Manager

**Services Offered:** A full service district sales office providing on line solutions in the management and financial information system areas on timesharing and mini computers. Graphics, remote computing, financial data bases, M.I.S. consulting services, customer training and industry seminars.



► **SCIENTIFIC TIME SHARING CORPORATION**

**Address:** Detroit Branch Office  
100 Renaissance Center, Suite 2910  
Detroit, Michigan 48243

**Telephone:** (313) 259-0220

**Local  
Contact:** John McCann  
Branch Manager

**Services  
Offered:** Full-service branch office, offering remote access service, customer training and seminars, applications consulting and technical support, programming and marketing services.

► **UNIVERSITY COMPUTING COMPANY**

**Address:** One Northfield Plaza  
5600 Crooks Road  
P.O. Box 58  
Troy, MI 48099

**Telephones:** (313) 879-9300

**Local  
Contact:** John Speicher  
Branch Manager

**Services  
Offered:** A full-service sales office offering remote computing service, card reader and high-speed printer for on-site processing and technical support.

**Edmonton, ALBERTA**

► **BOEING COMPUTER SERVICES CANADA, LTD.**

**Address:** Branch Office  
9803 102 A Avenue  
Edmonton, Alberta, Canada T5J-3A3

**Telephone:** (403) 426-0167

**Local  
Contact:** Ervin Krawchuk--Technical Representative

**Services  
Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► **BOEING COMPUTER SERVICES CANADA, LTD.**

**Address:** Branch Office  
505 Second Street, SW  
Calgary, Alberta, Canada T2P-1N8

**Telephone:** (403) 269-8281

**Local  
Contact:** Eric Ustad -- Marketing Manager

**Services  
Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► **I.P. SHARP ASSOCIATES LIMITED**

**Address:** Suite 505,  
10065 Jasper Avenue,  
Edmonton, Alberta T5J 3B1

**Telephone:** (403) 428-6744

**Local  
Contact:** Frank Arthur  
Branch Manager

**Services  
Offered:** Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.

► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** P.O. Box 9235, 202 - 6th Ave., S.W.  
Suite 1020, Bow Valley Square I  
Calgary, Alberta, Canada T20 2W5

**Telephone:** (403) 265-4926

**Local  
Contact:** Harry Toth  
Sales Representative

**Services  
Offered:** A full-service office, offering remote computing and consulting services.

► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** Suite 600  
10089 Jasper Ave.  
Edmonton, Alberta, Canada T5J 1V1

**Telephone:** (403) 428-8350

**Local  
Contact:** Jay Lydiatt  
Sales Representative

**Services  
Offered:** A full-service office, offering remote computing and consulting services.



**Fort Lauderdale,  
Hollywood, FL**

► **RAPIDATA, INC.**

**Address:** Branch Office  
2455 East Sunrise Blvd., Suite 220  
Fort Lauderdale, Florida 33304

**Telephone:** (305) 563-4311

**Local  
Contact:** Albert F. Courter  
Branch Manager

**Services  
Offered:** A full service district sales office providing on line solutions in the management and financial information system areas on timesharing and mini computers. Graphics, remote computing, financial data bases, M.I.S. consulting services, customer training and industry seminars.

**Grand Rapids, MI**

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 801  
151 South Rose Street  
Kalamazoo, Michigan 49007

**Telephone:** (616) 381-9173

**Local  
Contact:** Bob Gerwell  
District Manager

**Services  
Offered:** Full remote computing service, line printer, desktop plotter, consulting and applications programming are available from this office.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Western Michigan Office  
2910 Lucerne Drive, S.E.  
Suite 230  
Grand Rapids, MI 49506

**Telephone:** (616) 942-8800

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** 507 36th Street SE  
Grand Rapids, MI 49508

**Telephone:** (616) 247-4811

**Local  
Contact:** J. C. Ferguson  
Branch Marketing Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

**Greensboro,  
Winston-Salem,  
High Point, NC**

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Greensboro Branch  
Northline Avenue  
FORUM VI  
Suite 666  
Greensboro, NC 27408

**Telephone:** (919) 292-7230

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.





► HONEYWELL DATANETWORK

Address: 3405 West Wendover Ave.  
Greensboro, NC 27407

Telephone: (919) 294- 3280

Local  
Contact: V. Majors  
Branch Marketing Manager

Services  
Offered: Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.

► SCIENTIFIC TIME SHARING CORPORATION

Address: Southeast Marketing Office  
400 Eastowne Drive, Suite 108  
Chapel Hill, N. C. 27514

Telephone: (919) 493-2478

Local  
Contact: Janet H. Faltz  
Branch Manager

Services  
Offered: Full-service branch office, offering  
remote access service, customer training  
and seminars, applications consulting  
and technical support, programming and  
marketing services.

**Greenville,  
Spartanburg, SC**

► HONEYWELL DATANETWORK

Address: 150 Executive Center Drive  
Greenville, SC 29615

Telephone: (803) 288-1821

Local  
Contact: J. E. Clayton  
Branch Marketing Manager

Services  
Offered: Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.

**Hartford, CT**

► ADP NETWORK SERVICES, INC.

Address: Suite 508  
101 Pearl Street  
Hartford, Connecticut 06103

Telephone: (203) 527-2878

Local  
Contact: John Dublanica  
District Manager

Services  
Offered: Full remote computing service, line  
printer, desktop plotter, paper tape  
reader, consulting and applications  
programming are available from this  
office.

► ADP NETWORK SERVICES, INC.

Address: 1340 Washington Boulevard  
Stamford, Connecticut 06902

Telephone: (203) 324-6331

Local  
Contact: Don Holtz  
Office Manager

Services  
Offered: Full remote computing service,  
consulting and applications  
programming are available from  
this office.

► CALldata SYSTEMS, INC.

Address: 69 East Avenue  
Norwalk, CT 06851

Telephone: (203) 853-4922

Local  
Contact: Ken Lee  
Sales Representative

Services  
Offered: A full-service branch office of-  
fering local and remote computing,  
interactive and batch terminals,  
technical support and consulting  
services.





► GENERAL ELECTRIC INFORMATION SERVICES CO.

Address: GE Fairfield Branch  
3135 Easton Turnpike  
Building WS23  
Fairfield, CT 06431

Telephone: (203) 373-2778

Local  
Contact: Branch Manager

Services  
Offered: A full service branch office.

► GENERAL ELECTRIC INFORMATION SERVICES CO.

Address: Stamford District/Branch  
Largo Building, 3rd Floor  
2777 Summer Street  
Stamford, CT 06905

Telephone: (203) 357-4765

Local  
Contact: Branch Manager

Services  
Offered: A full service branch office.

► GENERAL ELECTRIC INFORMATION SERVICES CO.

Address: Hartford District/Branch  
111 Founders Plaza  
Suite 413  
East Hartford, CT 06108

Telephone: (203) 289-7941

Local  
Contact: Branch Manager

Services  
Offered: A full service branch office.

► HONEYWELL DATANETWORK

Address: Westport One  
830 State Street East  
Westport, CT 06880

Telephone: (203) 226-1051

Local  
Contact: S. L. Nadler  
Branch Marketing Manager

Services  
Offered: Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.

► RAPIDATA, INC.

Address: Branch Office  
Bushnell Plaza, One Gold Street  
Hartford, Connecticut 06103

Telephone: (203) 525-3360

Local  
Contact: Leonard Burke  
Branch Manager

Services  
Offered: A full service district sales office pro-  
viding on line solutions in the manage-  
ment and financial information system  
areas on timesharing and mini computers.  
Graphics, remote computing, financial  
data bases, M.I.S. consulting services,  
customer training and industry seminars.

► RAPIDATA, INC.

Address: District Sales Office  
1234 Summer Street  
Stamford, Connecticut 06905

Telephone: (203) 325-4338

Local  
Contact: William Regan  
Northern Regional Manager

Services  
Offered: A full service district sales office pro-  
viding on-line solutions in the manage-  
ment and financial information system  
areas on time-sharing and mini computers.  
Graphics, remote computing, financial  
data bases, M.I.S. consulting services,  
customer training and industry seminars.

► SCIENTIFIC TIME SHARING CORPORATION

Address: Hartford Branch Office  
111 Pearl Street, Suite 401  
Hartford, Connecticut 06103

Telephone: (203) 549-0107

Local  
Contact: Gary A. Bergquist  
Branch Manager

Services  
Offered: Full-service branch office, offering  
remote access service, customer training  
and seminars, applications consulting  
and technical support, programming and  
marketing services.

► SUN INFORMATION SERVICES COMPANY

Address: Branch Office  
500 Post Rd. East  
Westport, CT 06880

Telephone: (203) 226-3517

Local  
Contact: W.J. Clark  
Branch Manager

Services  
Offered: A full-service branch office, offering  
remote and interactive computing,  
consulting services, remote batch  
facilities, and rental of computer  
terminal equipment



► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** 799 Main Street  
Hartford, Conn. 06103

**Telephone:** (203) 522-3534

**Local  
Contact:** Mike Barad  
Branch Manager

**Services  
Offered:** A full-service office offering remote  
computing and consulting services.

► **UNIVERSITY COMPUTING COMPANY**

**Address:** The Exchange  
270 Farmington Avenue  
Farmington, CT 06032

**Telephone:** (203) 677-7368

**Local  
Contact:** Phil Di Martino  
Sales Representative - N/C

**Services  
Offered:** A full-service sales office offering  
remote computing service, card reader  
and high speed printer for on-site  
processing and customer support.

► **WARNER COMPUTER SYSTEMS, INC.**

**Address:** 992 High Ridge Road  
Stamford, Conn. 06905

**Telephone:** (203) 329-8477

**Local  
Contact:** Frank Crocker

**Services  
Offered:** Full service branch office offering  
remote computing, remote batch facil-  
ities, facilities for clients, pro-  
gramming and consulting services.

► **HONEYWELL DATANETWORK**

**Address:** Suite 301  
677 Ala Moana Blvd.  
Honolulu, HI 96813

**Telephone:** (808) 537-5514

**Local  
Contact:** D. Strong  
Pacific Regional Manager

**Services  
Offered:** Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.

► **SCIENTIFIC TIME SHARING CORPORATION**

**Address:** Honolulu Branch Office  
691 Kalanipuu Street  
Honolulu, Hawaii 96825

**Telephone:** (808) 395-8669

**Local  
Contact:** Charles Gray  
Branch Manager

**Services  
Offered:** Full-service branch office, offering  
remote access service, customer training  
and seminars, applications consulting  
and technical support, programming and  
marketing services.

**Honolulu, HI**



**Houston, TX**

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Houston District  
Commercial Branch  
Petroleum Branch  
Dresser Tower, Suite 510  
601 Jefferson  
Houston, TX 77001  
**Telephone:** (713) 652-0405

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **I.P. SHARP ASSOCIATES, INC.**

**Address:** Suite 925, One Corporate Square,  
2600 Southwest Freeway,  
Houston, Texas 77098  
**Telephone:** (713) 526-5275

**Local  
Contact:** Robin Dutton  
Branch Manager

**Services  
Offered:** Computer time-sharing and systems  
consulting with full service facilities  
for customer training, seminars,  
technical support and programming.

► **MCDONNELL DOUGLAS AUTOMATION CO. (MCAUTO)**

**Address:** Suite 400  
500 Jefferson Street  
Houston, Texas 77002

**Telephone:** (713) 652-4100

**Local  
Contact:** Charles V. Bentley  
Manager, Gulf Coast Area

**Services  
Offered:** A full service regional office offering  
remote batch and conversational services  
and facilities, consulting, systems  
design and programming.

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 1112  
1300 Main Street  
Houston, Texas 77002

**Telephone:** (713) 658-1732

**Local  
Contact:** John Spigelmyer  
District Manager

**Services  
Offered:** Full remote computing service, line  
printer, desktop plotter, card reader,  
consulting and applications program-  
ming are available from this office.

► **HONEYWELL DATANETWORK**

**Address:** Post Oak Park  
P.O. Box 22233  
1535 West Loop South  
Houston, TX 77027

**Telephone:** (713) 780-6500

**Local  
Contact:** R. M. Tanner  
Branch Manager

**Services  
Offered:** Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.

► **MARTIN MARIETTA DATA SYSTEMS**

**Address:** Martin Marietta Data Systems  
One Riverway  
Suite 2400  
Houston, Texas 77056

**Telephone:** (713) 840-0394

**Local  
Contact:** Dave Alff  
RCS Sales

**Services  
Offered:** A full-service office, offering remote  
computing, consulting services, remote  
batch facilities.

► **SCIENTIFIC TIME SHARING CORPORATION**

**Address:** Houston Branch Office  
9 Greenway Plaza, Suite 1704  
Houston, Texas 77046

**Telephone:** (713) 850-9400

**Local  
Contact:** Pete Lemery  
Branch Manager

**Services  
Offered:** Full-service branch office, offering  
remote access service, customer training  
and seminars, applications consulting  
and technical support, programming and  
marketing services.





► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** Suite 346  
4544 Post Oak Place  
Houston, Texas 77027

**Telephone:** (713) 622-5351

**Local  
Contact:** Pete Linden  
District Manager

**Services  
Offered:** A full-service office offering remote  
computing and consulting services.

► **UNIVERSITY COMPUTING COMPANY**

**Address:** 4801 Woodway  
Suite 140 West  
Houston, TX 77056

**Telephone:** (713) 961-3444

**Local  
Contact:** Dave Kniffen  
Southern Regional Manager

**Services  
Offered:** A full-service sales office offering  
remote computing service, card reader  
and high speed printer for on-site  
processing and customer support.

**Indianapolis, IN**

► **ADP NETWORK SERVICES, INC.**

**Address:** 6435 Castleway Drive East  
Indianapolis, Indiana 46250

**Telephone:** (317) 842-4010

**Local  
Contact:** Jeff Linck  
District Manager

**Services  
Offered:** Full remote computing service, line  
printer, consulting and applications  
programming are available from this  
office.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Indianapolis District/Branch  
Castleview Building  
8000 Knue Road  
Suite 404  
Indianapolis, IN 46250

**Telephone:** (317) 842-0100

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** P.O. DRAWER AT41366  
5739 Professional Circle  
Indianapolis, IN 46241

**Telephone:** (317) 243-0831

**Local  
Contact:** J. Stevenson  
Marketing Manager

**Services  
Offered:** Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.

**Jacksonville, FL**

► **HONEYWELL DATANETWORK**

**Address:** 4040 Woodcock Drive  
Jacksonville, FL 32207

**Telephone:** (904) 396-6971

**Local  
Contact:** L. Beeler  
Account Manager

**Services  
Offered:** Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.

**Jersey City, NJ**

► HONEYWELL DATANETWORK

Address: 26 Main St.  
Chatham, NJ 07928

Telephone: (201) 635-1600

Local  
Contact: J. P. Larkin  
Branch Manager

Services  
Offered: Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

**Kansas City, MO KS**

► BOEING COMPUTER SERVICES COMPANY

Address: Branch Office  
East Pike Building  
Suite 200  
453 South Webb Road  
Wichita, Kansas 67202

Telephone: (316) 681-6911

Local  
Contact: Kelly Carter -- Sales Representative

Services  
Offered: Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► COMPUTER BUSINESS SYSTEMS

Address: 1108 Main  
Hays, KS 67601

Telephone: (913) 628-6106

Local  
Contact: Jon Hanna

Services  
Offered: Remote computing and consulting services.

► GENERAL ELECTRIC INFORMATION SERVICES CO.

Address: Kansas City Branch  
911 Main Street  
Suite 1020  
Kansas City, MO 64105

Telephone: (816) 471-4664

Local  
Contact: Branch Manager

Services  
Offered: A full service branch office.

► HONEYWELL DATANETWORK

Address: 8401 East 50 Highway  
Kansas City, MO 64133

Telephone: (816) 358-4200

Local  
Contact: P. C. Watson  
Branch Manager

Services  
Offered: Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► UNITED COMPUTING SYSTEMS, INC.

Address: Suite 200  
4801 W. 110 St.  
Overland Park, Kansas 66211

Telephone: (913) 341-9330

Local  
Contact: Herman Sullivan  
District Manager

Services  
Offered: A full-service office, offering remote computing and consulting services.



**Los Angeles,  
Long Beach, CA**

► **AVCO COMPUTER SERVICES**

**Address:** 9841 Airport Boulevard, Suite 1130  
Los Angeles, California 90045

**Telephone:** (213) 645-1760

**Local  
Contact:** William D. Benz

**Services  
Offered:** Timesharing and remote batch processing on IBM equipment. CRT and drum plotting capability. Applications software to satisfy business, engineering, scientific and statistical requirements. Custom software engineering.

► **CALldata SYSTEMS, INC.**

**Address:** 10100 Santa Monica Blvd.  
Los Angeles, CA 90024

**Telephone:** (213) 552-1188

**Local  
Contact:** Hal Robins  
District Sales Manager

**Services  
Offered:** A full-service district office offering local and remote computing, interactive and batch terminals, technical support and consulting services.

► **COMPUTER USAGE COMPANY**

**Address:** Los Angeles Branch Office  
1545 Wilshire Boulevard  
Los Angeles, CA 90017

**Telephone:** (213) 484-2282

**Local  
Contact:** Paul Brestyanszky  
LA Product Marketing Manager

**Services  
Offered:** A full service branch office offering APL time sharing, remote batch access, WYLBUR, card reader and printer on-site, customer training and seminars, applications consulting, technical support, and marketing services.

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 740  
3660 Wilshire Boulevard  
Los Angeles, California 90010

**Telephone:** (213) 480-3122

**Local  
Contact:** David Schoeff  
District Manager

**Services  
Offered:** Full remote computing service, line printer, desktop plotter, card reader, consulting and applications programming are available from this office.

► **BOEING COMPUTER SERVICES COMPANY**

**Address:** Branch Office  
871 South Nash Street  
El Segundo, CA 90245

**Telephone:** (213) 640-0210

**Local  
Contact:** Jim Steffien -- Branch Manager

**Services  
Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► **COMPUTER PARTS EXCHANGE, INC.**

**Address:** 20958 Nordhoff Street  
Chatsworth, CA 91311

**Telephone:** (213) 341-3783

**Local  
Contact:** Robert MacGonigal  
Marketing Manager

**Services  
Offered:** Replacement absolute filters and disc heads. Repair of core memory, disc and tape heads, circuit cards, spindles and power supplies.  
All types of computer systems.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Los Angeles District/Branch  
3550 Wilshire Blvd.  
Suite 1400  
Los Angeles, CA 90010

**Telephone:** (213) 385-9411

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.





▶ **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Orange County District/Branch  
The Koll Center  
4590 MacArthur Blvd.  
Suite 530  
Newport Beach, CA 92660

**Telephone:** (714) 975-0356

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

▶ **HONEYWELL DATANETWORK**

**Address:** 5959 W. Century Blvd.  
Los Angeles, CA 90045

**Telephone:** (213) 670-5281

**Local  
Contact:** C. P. Reilly  
Branch Manager, Br. 525 Suite 600

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

▶ **INFORMATICS INC.**

**Address:** Los Angeles Sales Office  
10100 Santa Monica Boulevard  
Suite 300  
Los Angeles, California 90067

**Telephone:** (213) 553-3524

**Local  
Contact:** W. R. Macauley

**Services  
Offered:** A full service branch, offering interactive timesharing, remote batch (RJE), applications software services and consulting.

▶ **I.P. SHARP ASSOCIATES, INC.**

**Address:** Suite 1135,  
610 Newport Center Drive,  
Newport Beach, California 92660

**Telephone:** (714) 644-5112

**Local  
Contact:** Esther Ettinger  
Branch Manager

**Services  
Offered:** Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.

▶ **MARTIN MARIETTA DATA SYSTEMS**

**Address:** Martin Marietta Data Systems  
1901 Avenue of the Stars  
Suite 880  
Los Angeles, California 90067

**Telephone:** (213) 552-9541

**Local  
Contact:** Fred Serfas  
RCS District Manager

**Services  
Offered:** A full-service office, offering remote computing, consulting services, remote batch facilities.

▶ **MARTIN MARIETTA DATA SYSTEMS**

**Address:** Martin Marietta Data Systems  
18662 MacArthur Boulevard  
Suite 200  
Irvine, California 92715

**Telephone:** (714) 955-0235

**Local  
Contact:** Fred C. Serfas  
RCS District Manager

**Services  
Offered:** A full-service office, offering remote computing, consulting services, remote batch facilities.

▶ **ON-LINE SYSTEMS, INC.**

**Address:** Los Angeles Branch Office  
3407 W. Sixth Street  
Los Angeles, CA 90020

**Telephone:** (213) 386-7030

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full-service branch office of the OLS computer services network, offering local dial up and sales and technical support.

▶ **RAPIDATA, INC.**

**Address:** District Sales Office  
3250 Wilshire Blvd., Suite 1107  
Los Angeles, California 90010

**Telephone:** (213) 380-3373

**Local  
Contact:** Max Kupferman  
District Sales Manager

**Services  
Offered:** A full service district sales office providing on line solutions in the management and financial information system areas on timesharing and mini computers. Graphics, remote computing, financial data bases, M.I.S. consulting services, customer training and industry seminars.



► **ROSS SYSTEMS, INC.**

**Address:** Los Angeles Office  
1801 Avenue of the Stars  
Suite 640  
Los Angeles, Ca 90067

**Telephone:** (213) 553-8668

**Local Contact:** Bruce R. Gall  
Vice President

**Services Offered:** A full service office offering management consulting and computer time-sharing services. Specialized services for financial modeling and interactive data base management.

► **SCIENTIFIC TIME SHARING CORPORATION**

**Address:** Los Angeles Branch Office  
21243 Ventura Blvd., Suite 240  
Woodland Hills, California 91364

**Telephone:** (213) 340-4611

**Local Contact:** Gary D. Beynon  
Branch Manager

**Services Offered:** Full-service branch office, offering remote access service, customer training and seminars, applications consulting and technical support, programming and marketing services.

► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** Suite 410  
101 Continental Blvd.  
El Segundo, California 90245

**Telephone:** (213) 640-0891

**Local Contact:** Ted Hoisington  
Acting District Manager

**Services Offered:** A full-service office, offering remote computing and consulting services.

► **UNIVERSITY COMPUTING COMPANY**

**Address:** 888 North Sepulveda Blvd.  
El Segundo, CA 90245

**Telephone:** (213) 322-3093  
(213) 398-4255

**Local Contact:** Richard Bisby  
District Manager

**Services Offered:** A full-service branch office offering remote computing service, card reader and high speed printer for on-site processing and technical support.

**Louisville, KY IN**

► **HONEYWELL DATANETWORK**

**Address:** Suite 701  
1930 Bishop Lane  
Louisville, KY 40218

**Telephone:** (502) 456-1220

**Local Contact:** G. E. Miller  
Branch Marketing Manager

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

**Memphis, TN AR MS**

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 1430  
5050 Poplar  
Memphis, Tennessee 38157

**Telephone:** (901) 683-4551

**Local Contact:** John Cole  
Office Manager

**Services Offered:** Full remote computing service, line printer, desktop plotter, paper tape reader, card reader, consulting and applications programming are available from this office.

**Miami, FL**

► **HONEYWELL DATANETWORK**

**Address:** Suite 101  
5255 NW 87th Ave.  
Miami, FL 33166

**Telephone:** (305) 592-5293

**Local  
Contact:** W. C. Holley  
Branch Marketing Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **HONEYWELL DATANETWORK**

**Address:** P.O. Box 161062 Zip 38116  
2598 Corp. Ave. East  
Memphis, TN 38131

**Telephone:** (901) 345-6222

**Local  
Contact:**

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Miami Branch  
Commercial Branch  
Financial Branch  
1 Biscayne Tower  
Suite 2450

**Telephone:** Miami, FL 33131  
(305) 592-7610

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **I. P. SHARP ASSOCIATES, INC.**

**Address:** Suite D, Kennedy Building,  
14560 N.W. 60th Ave.,  
Miami Lakes, Florida 33014

**Telephone:** (305) 556-0577

**Local  
Contact:** Brian Oliver  
Branch Manager

**Services  
Offered:** Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.

**Milwaukee, WI**

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 990  
270 East Kilbourn Avenue  
Milwaukee, Wisconsin 53202

**Telephones:** (414) 224-9797

**Local  
Contact:** George Hayles  
District Manager

**Services  
Offered:** Full remote computing service, line printer, desktop plotter, cassette tape reader, CRT graphics plotter, consulting and applications programming are available from this office.



► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Milwaukee District/Branch  
615 East Michigan Street  
Suite 200  
Milwaukee, WI 53202

**Telephone:** (414) 271-7900

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** P.O. Box 26189 1st CL 53226  
3333 N. Mayfair (PP EX FT)  
Milwaukee, WI 53222

**Telephone:** (414) 771-6300

**Local  
Contact:** F. A. Kuehl  
Branch Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** Suite 1175  
2300 North Mayfair Road  
Wauwatosa, Wisconsin 53226

**Telephone:** (414) 475-9392

**Local  
Contact:** Lee Harwood  
Branch Manager

**Services  
Offered:** A full-service office, offering remote computing and consulting services.

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 103  
7801 Metro Parkway  
Minneapolis, Minnesota 55420

**Telephone:** (612) 854-9555

**Local  
Contact:** John Ross  
District Manager

**Services  
Offered:** Full remote computing service, line printer, desktop plotter, paper tape reader, consulting and applications programming are available from this office.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Minneapolis Branch  
1500 Lilac Drive, South  
Minneapolis, MN 55416

**Telephone:** (612) 542-0300

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** 7400 Metro Boulevard  
Minneapolis, MN 55435

**Telephone:** (612) 830-3500

**Local  
Contact:** D. F. Jaeger  
Branch Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

**Minneapolis,  
St. Paul, MN WI**

► I.P. SHARP ASSOCIATES, INC.

Address: Suite 1371,  
1 Appletree Square,  
Bloomington, Minnesota 55420

Telephone: (612) 854-3405

Local James Royer  
Contact: District Manager

Services: Computer time-sharing and systems  
Offered: consulting.

► LUPFER AND LONG, INCORPORATED

Address: Branch Office  
3050 Metro Drive, Suite 307  
Minneapolis, Minnesota 55420

Telephone: (612) 854-2207

Local Carol Iwata  
Contact: Branch Manager

Services: Specializing in software products and  
Offered: consulting services for the interactive  
and remote computing markets. Products  
available through national time-sharing  
vendors or for use on in-house minis or  
main frames.

► Minnesota Datasystems, Inc.

Address: 750 North Arm Drive  
Mound, Minn. 55364

Telephone: (612) 472-3033

Local Wm. Schmitt  
Contact: President

Services: Low-cost timesharing, with database  
Offered: management, word processing and general  
business programs available.

► UNITED COMPUTING SYSTEMS, INC.

Address: Suite 204  
5401 Gamble Drive  
Minneapolis, Minn. 55416

Telephone: (612) 545-6999

Local Dan Jones  
Contact: District Manager

Services: A full-service office, offering remote  
Offered: computing and consulting services.

**Montreal, QUE**

► HONEYWELL DATANETWORK

Address: Honeywell Limitee  
La Cite  
300 Rue Leo Pariseau  
Montreal Quebec Canada H2W 2N1

Telephone: (514) 844-9511

Local  
Contact: D. Weiss  
Regional Director

Services: Interactive time sharing, remote job  
Offered: entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.

► I.P. SHARP ASSOCIATES LIMITED

Address: Suite 1610,  
555 Dorchester Blvd. W.,  
Montreal, Quebec H2Z 1B1

Telephone: (514) 966-3366

Local Walter Keirstead  
Contact: Branch Manager

Services: Computer time-sharing and systems  
Offered: consulting with full service facilities  
for customer training, seminars,  
technical support and programming.

**Nashville,  
Davidson, TN**

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Nashville Branch  
The Oaks  
Suite 428  
1101 Kermit Drive  
Nashville, TN 37217  
**Telephone:** (615) 361-3063

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** P.O. Box 15285 (1st Class)  
2401 Hillsboro Road  
Nashville, TN 37212

**Telephone:** (615) 385-3400

**Local  
Contact:** T. J. Williams  
Branch Manager Marketing

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **TIMESHARING UNLIMITED, INC.**

**Address:** 1100 Kermit Drive, Suite 200  
Nashville, Tennessee 37217

**Telephone:** 615-367-1469

**Local  
Contact:** Trevor M. Evans, President  
Joseph F. Bass, Systems Manager

**Services  
Offered:** A commercial timesharing operation, offering remote computing, a management interactive data accounting system, consulting, specialized programming, and data base.

**Nassau,  
Suffolk, NY**

► **CALLDATA SYSTEMS, INC.**

**Address:** 280 Crossways Park Drive  
Woodbury, NY 11797

**Telephone:** (516) 575-2833

**Local  
Contact:** Bob Engler  
District Sales Manager

**Services  
Offered:** A full-service district office offering local and remote computing, interactive and batch terminals, technical support and consulting services.

► **HONEYWELL DATANETWORK**

**Address:** 1615 Northern Blvd.  
Manhasset Line, NY 11030

**Telephone:** (516) 869-8200

**Local  
Contact:** J. Abbot  
Branch Marketing Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **RAPIDATA, INC.**

**Address:** District Sales Office  
900 Walt Whitman Road, Suite 103  
Melville, New York 11747

**Telephone:** (516) 427-7788

**Local  
Contact:** Pat Palladino  
District Sales Manager

**Services  
Offered:** A full service district sales office providing on line solutions in the management and financial information system areas on timesharing and mini computers. Graphics, remote computing, financial data bases, M.I.S. consulting services, customer training and industry seminars.





**New Brunswick,  
Perth Amboy,  
Sayreville, NJ**

► **AVCO COMPUTER SERVICES**

**Address:** 171 W. Main Street  
Rockaway, New Jersey 07866

**Telephone:** (201) 625-3838

**Local  
Contact:** William J. Guillorn

**Services  
Offered:** Time sharing and remote batch processing on IBM equipment. CRT and drum plotting capability. Applications software to satisfy business engineering, scientific and statistical requirements. Custom software engineering.

**New Orleans, LA**

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** New Orleans Branch  
1 Shell Square  
Suite 4050  
New Orleans, LA

**Telephone:** (504) 552-7415

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** Elmwood Park Suite 201  
800 Commerce Road East  
New Orleans, LA 70123

**Telephone:** (504) 733-1600

**Local  
Contact:** W. J. Breerwood  
Branch Marketing Manager

**Services  
Offered:** Interactive time sharing, remote job entry and remote batch services with toll free nationwide access, local branch support and customer service hotline.

► **UNIVERSITY COMPUTING COMPANY**

**Address:** 3818 One Shell Square  
New Orleans, LA 70139

**Telephone:** (504) 524-2900

**Local  
Contact:** Jerry Whittredge  
Sales Representative

**Services  
Offered:** A full-service sales office offering remote computing service, card reader and high speed printer for on-site processing and technical support.

**New York, NY NJ**

► **ADP NETWORK SERVICES, INC.**

**Address:** 10th Floor  
425 Park Avenue  
New York, New York 10005

**Telephone:** (212) 980-4880

**Local  
Contact:** Don Holtz  
District Manager

**Services  
Offered:** Full remote computing service, line printer, desktop plotter, paper tape reader, card reader, consulting and applications programming are available from this office.

► ADP NETWORK SERVICES, INC.

**Address:** Suite 1855  
120 Broadway  
New York, New York 10005

**Telephone:** (212) 577-7575

**Local  
Contact:** Geraldine Geist  
District Manager

**Services  
Offered:** Full remote computing service, special office serving the banking industry, line printer, desktop plotter, card reader, consulting and applications programming are available from this office.

► ADP NETWORK SERVICES, INC.

**Address:** Suite 2225  
120 Broadway  
New York, New York 10005

**Telephone:** (212) 577-7580

**Local  
Contact:** Sally Breckenridge  
District Manager

**Services  
Offered:** Full remote computing service, special office serving the brokerage industry, line printer, desktop plotter, card reader, consulting and applications programming available from this office.

► BOEING COMPUTER SERVICES COMPANY

**Address:** Branch Office  
825 Third Avenue  
New York, New York 10022

**Telephone:** (212) 486-7240

**Local  
Contact:** Gary Plewak -- Branch Manager

**Services  
Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► CALldata SYSTEMS, INC.

**Address:** 1180 Avenue of Americas  
New York, NY 10036

**Telephone:** (212) 764-1180

**Local  
Contact:** Joe Frank  
District Sales Manager

**Services  
Offered:** A full-service district office offering local and remote computing, interactive and batch terminals, technical support and consulting services.

► Citishare

**Address:** Citicorp Center  
153 East 53 Street  
New York, New York 10043

**Telephone:** (212) 559-3636

**Local  
Contact:** Seymour Brooks  
Assistant Vice President

**Services  
Offered:** Full service national office offering remote computing services, technical support and products in the areas of financial planning and programming languages.

► COMPUTER USAGE COMPANY

**Address:** New York Branch Office  
3 Park Avenue  
New York, NY 10016

**Telephone:** (212) 686-7024

**Local  
Contact:** Robert B. Jacoby  
Eastern Regional Marketing Manager-APL

**Services  
Offered:** A full service branch office offering APL time sharing, remote batch access, WYLBUR, card reader and printer on-site, customer training, applications consulting, technical support and marketing services.

► GENERAL ELECTRIC INFORMATION SERVICES CO.

**Address:** Eastern TELCO District  
AT&T TELCO Branch  
NY TELCO Branch  
WECO Branch  
McGraw Hill Bldg., Suite 3325  
**Telephone:** 1221 Avenue of the Americas  
New York, NY 10020  
(212) 997-0302

**Local  
Contact:** District or branch managers

**Services  
Offered:** Full service branch offices.

► GENERAL ELECTRIC INFORMATION SERVICES CO.

**Address:** Long Island Branch  
1 Huntington Quadrangle  
Suite 3N07  
Huntington, NY 11746

**Telephone:** (516) 752-8033

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► GENERAL ELECTRIC INFORMATION SERVICES CO.

Address: New York Financial District/Branch  
McGraw Hill Building  
Suite 3325  
1221 Avenue of the Americas  
New York, NY 10020  
Telephone: (212) 997-0348

Local  
Contact: Branch Manager

Services  
Offered: A full service branch office.

► GENERAL ELECTRIC INFORMATION SERVICES CO.

Address: New York Manhattan Branch  
McGraw Hill Building  
Suite 3325  
1221 Avenue of the Americas  
New York, NY 10020  
Telephone: (212) 997-0372

Local  
Contact: Branch Manager

Services  
Offered: A full service branch office.

► GLOBAL INFORMATION SERVICES, INC.

Address: Headquarters, GIS/USA  
43-23 Colden Street  
Flushing, New York 11355

Telephone: (212) 461-8168

Local  
Contact: Takeshi Utsumi, Ph.D.  
President

Services  
Offered: Shared international marketing of computer oriented information services to match users to vendors, marketing surveys and consultation, utilizing public value added networks (VANs) worldwide.

► HONEYWELL DATANETWORK

Address: 1211 Ave. of the Americas  
New York, NY 10036

Telephone: (212) 398-6400

Local  
Contact: S. J. Canariato  
Branch Manager

Services  
Offered: Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► INFORMATICS INC.

Address: New York Sales Office  
1500 Broadway  
New York, New York

Telephone: (212) 869-1750

Local  
Contact: Philip Scibona  
Branch Manager

Services  
Offered: A full service branch, offering interactive timesharing, remote batch (RJE), applications software services, and consulting.

► I.P. SHARP ASSOCIATES, INC.

Address: Suite 242, East Mezz.,  
200 Park Ave.,  
New York, N.Y. 10017

Telephone: (212) 986-3366

Local  
Contact: Keith Iverson  
Branch Manager

Services  
Offered: Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.

► MARTIN MARIETTA DATA SYSTEMS

Address: Martin Marietta Data Systems  
1301 Avenue of the Americas  
27th Floor  
New York, New York 10019

Telephone: (212) 541-4740

Local  
Contact: Art Paige  
RCS Regional Sales Manager

Services  
Offered: A full-service office, offering remote computing, consulting services, remote batch facilities.

► MHT Services, Inc.

Address: 510 Sylvan Avenue  
Englewood Cliffs, N.J. 07632

Telephone: (201) 567-1333

Local  
Contact: Martin H. Tillinger  
President

Services  
Offered: Consulting, programming, systems analysis for time-sharing. Interfaces to batch systems and process control. Commercial and scientific applications.





► ON-LINE SYSTEMS, INC.

Address: New York City Branch Office  
600 Third Avenue  
New York, NY 10016

Telephone: (212) 661-1412

Local  
Contact: Branch Manager

Services  
Offered: A full-service branch office of the OLS  
computer services network, offering  
local dial up and sales and technical  
support.

► RAPIDATA, INC.

Address: Corporate Headquarters  
20 New Dutch Lane  
Fairfield, New Jersey 07006

Telephone: (201) 227-0035

Local  
Contact: Thomas Campbell  
Vice President, Marketing

Services  
Offered: Corporate headquarters, nationwide  
computer and network control center.

► RAPIDATA, INC.

Address: District Sales Office  
350 Fifth Avenue, Suite 3907  
New York, New York 10001

Telephone: (212) 760-0200

Local  
Contact: Peter Rentz  
N.Y. Metro Regional Manager

Services  
Offered: A full service district sales office pro-  
viding on line solutions in the manage-  
ment and financial information system  
areas on timesharing and mini computers.  
Graphics, remote computing, financial  
data bases, M.I.S. consulting services,  
customer training and industry seminars.

► SCIENTIFIC TIME SHARING CORPORATION

Address: White Plains Branch Office  
7 Holland Avenue  
White Plains, New York 10603

Telephone: (914) 428-6910

Local  
Contact: Rex Swain  
Branch Manager

Services  
Offered: Full-service branch office, offering  
remote access service, customer training  
and seminars, applications consulting  
and technical support, programming and  
marketing services.

► SCIENTIFIC TIME SHARING CORPORATION

Address: APL\*PLUS International  
747 Third Avenue  
New York, New York 10017

Telephone: (212) 751-9305  
TWX 7105812254

Local  
Contact: Kevin R. Weaver

Services  
Offered: International Headquarters

► SCIENTIFIC TIME SHARING CORPORATION

Address: Banking Services Office  
747 Third Avenue  
New York, New York 10017

Telephone: (212) 751-9305

Local  
Contact: Seth Alpert

Services  
Offered: Specialized branch serving the financial  
industry worldwide and nationwide.

► SCIENTIFIC TIME SHARING CORPORATION

Address: New York City Branch Office  
747 Third Avenue  
New York, New York 10017

Telephone: (212) 751-9305

Local  
Contact: Roger A. Williams  
Branch Manager

Services  
Offered: Full-service branch office, offering  
remote access service, customer training  
and seminars, applications consulting  
and technical support, programming and  
marketing services.

► SDL/DATACROWN INC.

Address: 437 Madison Avenue  
New York, New York 10022

Telephone: (212) 758 - 2330

Local  
Contact: James Livingston  
Branch Manager

Services  
Offered: A full-service branch office, offering  
remote computing, consulting services,  
remote batch facilities, and rental of  
computer terminal equipment.



► **SUN INFORMATION SERVICES COMPANY**

**Address:** Branch Office  
29 Emmons Drive, Bldg. E  
Princeton, N.J. 08540

**Telephone:** (609) 452-8110

**Local Contact:** Thomas Warren  
Branch Manager

**Services Offered:** A full-service branch office, offering remote and interactive computing, consulting services, remote batch facilities, and rental of computer terminal equipment.

► **SUN INFORMATION SERVICES COMPANY**

**Address:** Branch Office  
122 East 42nd St., Suite 1700  
New York, N.Y. 10017

**Telephone:** (212) 490-2811

**Local Contact:** George Flynn      Jack Pomianowski  
Branch Manager      SUNGARD Marketing Manager

**Services Offered:** A full-service branch office, offering SUNGARD disaster backup and recovery services, remote and interactive computing, consulting services, remote batch facilities, and rental of computer terminal equipment.

► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** Suite 1850  
2 Pennsylvania Plaza  
New York, New York 10001

**Telephone:** (212) 563-8484

**Local Contact:** Paul Morrow  
Regional Manager

**Services Offered:** A full-service office, offering remote computing and consulting services.

► **UNIVERSITY COMPUTING COMPANY**

**Address:** 747 Third Avenue, 32nd Floor  
New York, NY 10017

**Telephone:** (212) 421-8850

**Local Contact:** Don Seidenfrau  
Northeastern Regional Manager

**Services Offered:** A full-service sales office offering remote computing service, card reader and high speed printer for on-site processing and technical support.

► **WARNER COMPUTER SYSTEMS, INC.**

**Address:** 605 Third Avenue  
New York, New York 10016

**Telephone:** (212) 697-0110

**Local Contact:** Jim Gilland

**Services Offered:** The main office, offering remote computing, remote batch facilities, facilities for clients, programming and consulting services.

► **WEISS ASSOCIATES**

**Address:** 127 Michael Drive  
Red Bank, New Jersey 07701

**Telephone:** (201) 530-9260

**Local Contact:** George F. Weiss  
President

**Services Offered:** Consulting, systems analysis, programming for APL systems. Timesharing or in-house implementation. Financial planning and modeling using GENESIS, an interactive system for computational data bases with lateral and hierarchical consolidations.

► **WINCHESTER COMPUTER CORP**

**Address:** 1270 Broadway  
New York, N.Y. 10001

**Telephone:** (212) 594-3030

**Local Contact:** Dan Somma

**Services Offered:** Remote computing, consulting services, programming, fixed monthly time sharing pricing, packages for investment banking and president's wage guideline



**Newark, NJ**

► **ADP NETWORK SERVICES, INC.**

**Address:** Communications District  
119 Littleton Road  
Parsippany, New Jersey 07054

**Telephone:** (201) 335-6100

**Local Contact:** Juanita Homa  
District Manager

**Services Offered:** Provides consulting and computing solutions for the Telephone Industry. Experience includes market profile systems, rate and tariff planning, budgeting and project management.

► **ADP NETWORK SERVICES, INC.**

**Address:** 119 Littleton Road  
Parsippany, New Jersey 07054

**Telephone:** (201) 335-6100

**Local Contact:** Dan Shumate  
District Manager

**Services Offered:** Full remote computing service, line printer, desktop plotter, paper tape reader, consulting and applications programming are available from this office.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** New Jersey District/Branch  
33 Evergreen Place  
East Orange, NJ 07018

**Telephone:** (201) 672-0700

**Local Contact:** Branch Manager

**Services Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** 26 Main St.  
Chatham, NJ 07928

**Telephone:** (201) 635-1600

**Local Contact:** J. P. Larkin  
Branch Manager

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **INFORMATICS INC.**

**Address:** Data Services Division  
New Jersey Sales Office  
6 Kingsbridge Road  
Fairfield, New Jersey 07006

**Telephone:** (201) 575-9610

**Local Contact:** Gerard J. O'Connor  
Branch Manager

**Services Offered:** The Divisional Headquarters offers interactive timesharing, remote batch (RJE), local batch, application software services and consulting.

► **ON-LINE SYSTEMS, INC.**

**Address:** New Jersey Branch Office  
1005 Clifton Avenue  
Clifton, NJ 07013

**Telephone:** (201) 779-3444

**Local Contact:** Branch Manager

**Services Offered:** A full-service branch office of the OLS computer services network, offering local dial up and sales technical support.

► **RAPIDATA, INC.**

**Address:** District Sales Office  
253 Passaic Avenue  
Fairfield, New Jersey 07006

**Telephone:** (201) 227-5950

**Local Contact:** John Dilley  
District Sales Manager

**Services Offered:** A full service district sales office providing on line solutions in the management and financial information system areas on timesharing and mini computers. Graphics, remote computing, financial data bases, M.I.S. consulting services, customer training and industry seminars.





► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** 900 Route 9  
Woodbridge, NJ 07095

**Telephone:** (201) 634-1290

**Local  
Contact:** Joe Nodzak  
Branch Manager

**Services  
Offered:** A full-service office, offering remote  
computing and consulting services.

► **UNIVERSITY COMPUTING COMPANY**

**Address:** 636 Morris Turnpike  
Second Floor  
Short Hills, NJ 07078

**Telephone:** (201) 828-3900

**Local  
Contact:** Tony De Vita  
Sales Representative

**Services  
Offered:** A full-service sales office offering  
remote computing service, card reader  
and high speed printer for on-site  
processing and customer support.

► **WARNER COMPUTER SYSTEMS, INC.**

**Address:** 259 Cedar Lane  
Teaneck, New Jersey 07666

**Telephone:** (201) 692-9400

**Local  
Contact:** Hellmut Hameyer

**Services  
Offered:** Branch office offering line printer  
and complete data entry and output  
capabilities using tape, disk and  
cards.

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 201  
3 Koger Executive Center  
Norfolk, Virginia 23502

**Telephone:** (804) 461-1903

**Local  
Contact:** Lawrence Massa  
District Manager

**Services  
Offered:** Full remote computing service, con-  
sulting and applications programming  
are available from this office.

► **HONEYWELL DATANETWORK**

**Address:** Suite 106  
18 Koger Executive Center  
Norfolk, VA 23502

**Telephone:** (804) 461-0200

**Local  
Contact:** J. Nelson  
Res. Marketing Manager

**Services  
Offered:** Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.

**Norfolk,  
Virginia Beach,  
Portsmouth, VA NC**



**Northeast PA**

► **HONEYWELL DATANETWORK**

**Address:** 200 Mundy Street  
Wilkes-Barre, PA 18702

**Telephone:** (717) 654-2477

**Local  
Contact:**

**Services  
Offered:** Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.

**Oklahoma City, OK**

► **HONEYWELL DATANETWORK**

**Address:** 6100 N. Grand Blvd.  
Oklahoma City, OK 73118

**Telephone:** (405) 848-2811

**Local  
Contact:** A. J. Berger  
Branch Systems Manager

**Services  
Offered:** Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local  
branch support and a customer service  
hotline.

► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** Jamestown Executive Center  
3005 NW 63rd Street  
Oklahoma City, Okla. 73116

**Telephone:** (405) 843-9784

**Local  
Contact:** Ed Carpenter  
Branch Manager

**Services  
Offered:** A full-service office, offering remote  
computing and consulting services.

**Omaha, NE IA**

► **BOEING COMPUTER SERVICES COMPANY**

**Address:** Branch Office  
Plaza of Americas Building  
7161 Mercy Road  
Suite 302A  
Omaha, Nebraska 68106

**Telephone:** (402) 397-2400

**Local  
Contact:** Norman Firkins -- Marketing Representative

**Services  
Offered:** Services include: timesharing & interactive &  
remote-batch; Executive Information Services;  
scientific & engineering; consulting; education  
& training; facilities mgmt.; data base mgmt.;  
both custom & packaged programs.

**Orlando, FL**

► HONEYWELL DATANETWORK

Address: Suite 201  
3035 South 72 Street  
Omaha, NE 68124

Telephone: (402) 393-8300

Local  
Contact: H. J. Rieser  
Branch Marketing Manager

Services  
Offered: Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► MARTIN MARIETTA DATA SYSTEMS

Address: Martin Marietta Data Systems  
Orlando Data Center  
Sand Lake Road  
P. O. Box 5837  
Orlando, Florida 32855

Telephone: (305) 855-1050

Local  
Contact: Ellis Tidwell  
RCS Sales

Services  
Offered: A full-service office, offering remote computing, consulting services, remote batch facilities.

► UNITED COMPUTING SYSTEMS, INC.

Address: Suite 111  
930 Woodcock Road  
Orlando, Fla. 32803

Telephone: (305) 896-3710

Local  
Contact: Jim Bogle  
District Manager

Services  
Offered: A full-service office, offering remote computing and consulting services.

**Ottawa, ONT**

► I.P. SHARP ASSOCIATES LIMITED

Address: Suite 600,  
265 Carling Ave.,  
Ottawa, Ontario K1S 2E1

Telephone: (613) 236-9942

Local  
Contact: Brian Daly  
Branch Manager

Services  
Offered: Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.





**Philadelphia, PA NJ**

► **ADP NETWORK SERVICES, INC.**

**Address:** 1101 State Road  
Princeton, New Jersey 08540

**Telephone:** (609) 921-1800

**Local  
Contact:** Jim Harrison  
District Manager

**Services  
Offered:** Full remote computing service, line printer, desktop plotter, paper tape reader, consulting and applications programming are available from this office.

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 1410  
2000 Market Street  
Philadelphia, Pennsylvania 19102

**Telephone:** (215) 963-9220

**Local  
Contact:** Dick Barbarics  
District Manager

**Services  
Offered:** Full remote computing service, line printer, desktop plotter, card reader, consulting and applications programming are available from this office.

► **BOEING COMPUTER SERVICES COMPANY**

**Address:** Branch Office  
Scott Plaza 2  
Industrial Highway  
Philadelphia, PA 19113

**Telephone:** (215) 522-3600

**Local  
Contact:** Robert Derrig -- Branch Manager

**Services  
Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► **CALLDATA SYSTEMS, INC.**

**Address:** Broad & 1346 Chestnut Sts.  
Philadelphia, PA 19107

**Telephone:** (215) 545-5600

**Local  
Contact:** Mike Yankanich  
District Sales Manager

**Services  
Offered:** A full-service district office offering local and remote computing, interactive and batch terminals, technical support and consulting services.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Philadelphia District  
Commercial Branch  
Industrial Branch  
3 Girard Plaza  
Suite 1400  
**Telephone:** Philadelphia, PA 19102  
(215) 244-5573

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Northern Region  
Centre Square West  
Suite 1516  
1500 Market Street  
Philadelphia, PA 19102  
**Telephone:** (215) 241-5500

**Local  
Contact:** Region Manager

**Services  
Offered:** A full service regional office.

► **HONEYWELL DATANETWORK**

**Address:** 121 Presidential Blvd.  
Bala Cynwyd, PA 19004

**Telephone:** (215) 835-2500

**Local  
Contact:** J. Kelly  
Branch Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **I.P. SHARP ASSOCIATES, INC.**

**Address:** Suite 407,  
1420 Walnut Street,  
Philadelphia, Pennsylvania 19102

**Telephone:** (215) 735-3327

**Local  
Contact:** David Steinbrook  
Branch Manager

**Services  
Offered:** Computer time-sharing and systems  
consulting with full service facilities  
for customer training, seminars,  
technical support and programming.

► **MARTIN MARIETTA DATA SYSTEMS**

**Address:** Martin Marietta Data Systems  
2000 Market Streetbuilding  
28th Floor  
Philadelphia, Pennsylvania 19103

**Telephone:** (215) 963-0225

**Local  
Contact:** D. Nicholas Panaccio  
Regional Manager

**Services  
Offered:** A full-service office, offering remote  
computing, consulting services, remote  
batch facilities.

► **ON-LINE SYSTEMS, INC.**

**Address:** Philadelphia Branch Office  
One Bala Cynwyd Plaza  
Bala Cynwyd, PA 19004

**Telephone:** (215) 667-1495

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full-service branch office of the OLS  
computer services network, offering  
local dial up and sales and technical  
support.

► **RAPIDATA, INC.**

**Address:** District Sales Office  
100 South Broad Street, Suite 1304  
Philadelphia, Pennsylvania 19110

**Telephone:** (215) 561-3122

**Local  
Contact:** Jon Couch  
Southern Regional Manager

**Services  
Offered:** A full service district sales office pro-  
viding on line solutions in the manage-  
ment and financial information system  
areas on timesharing and mini computers.  
Graphics, remote computing, financial  
data bases, M.I.S. consulting services,  
customer training and industry seminars.

► **SCIENTIFIC TIME SHARING CORPORATION**

**Address:** Philadelphia Branch Office  
3 Penn Center Plaza, Suite 2003  
Philadelphia, PA 19103

**Telephone:** (215) 564-3980

**Local  
Contact:** Robert Jacoby  
Branch Manager

**Services  
Offered:** Full-service branch office, offering  
remote access service, customer training  
and seminars, applications consulting  
and technical support, programming and  
marketing services.

► **SUN INFORMATION SERVICES COMPANY**

**Address:** Branch Office  
1500 Market St.  
Philadelphia, Pa. 19102

**Telephone:** (215) 972-4800

**Local  
Contact:** Thomas Pirolli  
Branch Manager

**Services  
Offered:** A full-service branch office, offering remote  
and interactive computing, consulting services,  
remote batch facilities, and rental of computer  
terminal equipment.

► **SUN INFORMATION SERVICES COMPANY**

**Address:** Home Office  
SUNGARD Computer Services  
1500 Center Square  
Philadelphia, Pa. 19102

**Telephone:** (215) 972-4776

**Local  
Contact:** R.J. Bogle  
Marketing Manager

**Services  
Offered:** SUNGARD Services provides disaster backup and  
recovery services for large scale IBM users by  
providing immediate and exclusive use of a fully  
operational computer center. The facility also  
offers a full range of other data processing  
services.

► **SUN INFORMATION SERVICES COMPANY**

**Address:** Home Office  
680 East Swedesford Rd., Suite 310  
Wayne, Pa. 19087

**Telephone:** (215) 293-0660

**Local  
Contact:** R.F. Bronner  
District Sales Manager

**Services  
Offered:** A full-service sales office, offering remote  
and interactive computing, consulting services,  
remote batch facilities, and rental of computer  
terminal equipment.

► UNI-COLL CORPORATION

Address: 3401 Science Center  
Philadelphia, Pennsylvania 19104

Telephone: (215) 387-3890

Local  
Contact: Jeffrey D. Balling  
Director of Sales

Services  
Offered: Full-service MP 370/168 computing.  
Batch RJE service, timesharing, national  
communications network, systems support,  
and application software libraries.

► UNITED COMPUTING SYSTEMS, INC.

Address: Suite 2026  
2 Penn Center Plaza  
Philadelphia, PA 19102

Telephone: (215) 568-6300

Local  
Contact: Nick Pavicic  
Branch Manager

Services  
Offered: A full-service office, offering remote  
computing and consulting services.

► UNIVERSITY COMPUTING COMPANY

Address: Honeywell Center  
111 Presidential Blvd.  
Bala Cynwyd, PA 19004

Telephone: (215) 667-8320

Local  
Contact: Gerry Van Dagna  
Branch Manager

Services  
Offered: A full-service sales office offering  
remote computing service, card reader  
and high speed printer for on-site  
processing and customer support.

**Phoenix, AZ**

► GENERAL ELECTRIC INFORMATION SERVICES CO.

Address: Phoenix Branch  
3225 North Central Avenue  
Suite 1112  
Phoenix, AZ 85004

Telephone: (602) 264-7881

Local  
Contact: Branch Manager

Services  
Offered: A full service branch office.

► HONEYWELL DATANETWORK

Address: Del Webb Townhouse  
100 W. Claredon Ste. 1600  
Phoenix, AZ 85013

Telephone: (602) 249-7190

Local  
Contact: W. E. Snyder  
Branch Manager

Services  
Offered: Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local branch  
support and a customer service hotline.

► I.P. SHARP ASSOCIATES, INC.

Address: Suite 503,  
3033 North Central Avenue,  
Phoenix, Arizona 85012

Telephone: (602) 264-6819

Local  
Contact: Rose Mary Owen  
Branch Manager

Services  
Offered: Computer time-sharing and systems  
consulting with full service facilities  
for customer training, seminars,  
technical support and programming.





**Pittsburgh, PA**

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Pittsburgh District/Branch  
Two Gateway Center  
Suite 670  
Pittsburgh, Pa 15222

**Telephone:** (412) 566-4186

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **MARTIN MARIETTA DATA SYSTEMS**

**Address:** Martin Marietta Data Systems  
Five Gateway Center  
Suite 708  
Pittsburgh, Pennsylvania 15222

**Telephone:** (412) 562-9405

**Local  
Contact:** Joe M. Scott  
RCS Sales

**Services  
Offered:** A full-service office, offering remote computing, consulting services, remote batch facilities.

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 220  
100 Forbes Avenue  
Pittsburgh, Pennsylvania 15222

**Telephone:** (412) 562-9480

**Local  
Contact:** Jim Payne  
District Manager

**Services  
Offered:** Full remote computing service, line printer, desktop plotter, paper tape reader, card reader, consulting and applications programming are available from this office.

► **HONEYWELL DATANETWORK**

**Address:** Four Parkway Center Bldg.  
875 Greentree Road Suite G9  
Pittsburgh, PA 15220

**Telephone:** (412) 928-4200

**Local  
Contact:** R. L. Jeschke  
Branch Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer services hotline.

► **ON-LINE SYSTEMS, INC.**

**Address:** Pittsburgh Branch Office  
One Allegheny Square, Suite 740  
Pittsburgh, PA 15212

**Telephone:** (412) 323-7133

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full-service branch office of the OLS computer services network, offering local dial up and sales and technical support.

► **RAPIDATA, INC.**

**Address:** Representative  
Pittsburgh National Bank  
5th and Wood Streets  
Pittsburgh, Pennsylvania 15222

**Telephone:** (412) 355-2867

**Local  
Contact:** George Cooper  
Vice President of M.I.S. Services

**Services  
Offered:** A full service district sales office providing on line solutions in the management and financial information system areas on timesharing and mini computers. Graphics, remote computing, financial data bases, M.I.S. consulting services, customer training and industry seminars.



**Portland, OR WA**

► **BOEING COMPUTER SERVICES COMPANY**

**Address:** Branch Office  
2104 SW 5th Avenue  
Portland, OR 97201

**Telephone:** (503) 228-0213

**Local Contact:** Richard Jones -- Sales Representative

**Services Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► **HONEYWELL DATANETWORK**

**Address:** 7150 SW Hampton Road  
Portland, OR 97223

**Telephone:** (503) 620-0511

**Local Contact:** L. M. Le Ross  
Branch Marketing Manager

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 460  
200 Southwest Market Street  
Portland, Oregon 97201

**Telephone:** (503) 224-9600

**Local Contact:** Doug Jacobson  
District Manager

**Services Offered:** Full remote computing service, line printer, desktop plotter, paper tape reader, card reader, consulting and applications programming are available from this office.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Portland Branch  
121 S.W. Salmon Street  
Suite 1030  
Portland, OR 97204

**Telephone:** (503) 221-5200

**Local Contact:** Branch Manager

**Services Offered:** A full service branch office.

► **TEKTRONIX, INC.**

**Address:** Headquarters  
P.O. Box 500  
Beaverton, Oregon 97077

**Telephone:** (503) 682-3411

**Local Contact:** Melissa Waggener

**Services Offered:** A full line of graphic terminals, PLOT 10 interactive graphing software, and peripherals designed specifically for remote computing; supported by personnel throughout the U.S. and Canada.

► **HONEYWELL DATANETWORK**

**Address:** Westminster Park  
20 Risho Avenue  
East Providence, RI 02914

**Telephone:** (401) 438-6000

**Local Contact:** Systems Representative

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.



**Richmond, VA**

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Richmond Branch  
Southern States Building  
5th Floor  
6606 W. Broad Street  
Richmond, VA 23230  
**Telephone:** (804) 285-9031  
**Local Contact:** Branch Manager  
**Services Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** Koger Executive Center #114  
1500 Forest Avenue  
Richmond, VA 23288  
**Telephone:** (804) 285-8211  
**Local Contact:** K. A. Lee  
Branch Marketing Manager  
**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

**Riverside,  
San Bernardino,  
Ontario, CA**

► **AVCO COMPUTER SERVICES**

**Address:** 880 E. Mill Street., P. O. Box 5867  
San Bernardino, California 92412  
**Telephone:** (714) 889-0696  
**Local Contact:** Edward A. Stearn  
**Services Offered:** Timesharing and remote batch processing on IBM equipment. CRT and drum plotting capability. Applications software to satisfy business, engineering, scientific and statistical requirements. Custom software engineering.

**Rochester, NY**

► **ADP NETWORK SERVICES, INC.**

**Address:** 5500 Main Street  
Williamsville, New York 14221  
**Telephone:** (716) 232-7400  
**Local Contact:** Tom Dingman  
Office Manager  
**Services Offered:** Full remote computing service, consulting and applications programming are available from this office.



► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Rochester District/Branch  
Lincoln First Tower  
One Lincoln First Square  
12th Floor  
Rochester, NY 14607  
**Telephone:** (716) 232-6523

**Local Contact:** Branch Manager

**Services Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** 100 Metro Park  
Rochester, NY 14623

**Telephone:** (716) 424-2700

**Local Contact:** J. A. Cravotta  
Branch Marketing Manager

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **I.P. SHARP ASSOCIATES, INC.**

**Address:** 1200 First Federal Plaza,  
Rochester, N.Y. 14614

**Telephone:** (716) 546-7270

**Local Contact:** Lael Kirk  
Branch Manager

**Services Offered:** Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.

► **ON-LINE SYSTEMS, INC.**

**Address:** Rochester Branch Office  
140 Allens Creek Road  
Rochester, NY 14618

**Telephone:** (716) 473-0170

**Local Contact:** Branch Manager

**Services Offered:** A full-service branch office of the OLS computer services network, offering local dial up and sales and technical support.

**Sacramento CA**

► **BOEING COMPUTER SERVICES COMPANY**

**Address:** Branch Office  
530 Bercut Drive  
Sacramento, CA 95814

**Telephone:** (916) 447-2113

**Local Contact:** Dick Chesbrough -- Sales Representative

**Services Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► **HONEYWELL DATANETWORK**

**Address:** Suite 495  
2020 Hurley Way  
Sacramento, CA 95825

**Telephone:** (916) 485-2221

**Local Contact:** J. Kopas  
Branch Marketing Manager

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.



**St. Louis, MO IL**

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** St. Louis District/Branch  
1015 Locust Street  
Suite 1130  
St. Louis, MO 63101

**Telephone:** (314) 342-7780

**Local Contact:** Branch Manager

**Services Offered:** A full service branch office.

► **MCDONNELL DOUGLAS AUTOMATION COMPANY**

**Address:** P.O. Box 516  
St. Louis, Missouri 63166

**Telephone:** (314) 232-8021

**Local Contact:** William R. Vickroy,  
Vice President-Marketing  
CDC & IBM based timesharing/remote batch  
processing, terminal facilities for walk-in use,  
**Services Offered:** IMS processing, interactive graphics, software  
sales and licensing, applications software,  
consulting and technical support, programming,  
data entry, local batch, ...

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 420  
727 North First Street  
St. Louis, Missouri 63102

**Telephone:** (314) 241-9130

**Local Contact:** Stan Flick  
District Manager

**Services Offered:** Full remote computing service, line  
printer, desktop plotter, consulting  
and applications programming are  
available from this office.

► **HONEYWELL DATANETWORK**

**Address:** 2055 Craigshire Drive  
St. Louis, MO 63141

**Telephone:** (314) 878-2400

**Local Contact:** T. W. Holland  
Branch Manager

**Services Offered:** Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local  
branch support and a customer service  
hotline.

► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** Suite 101 West  
7750 Clayton Road  
Clayton, MO 63117

**Telephone:** (314) 781-0123

**Local Contact:** Dan Tobin  
Branch Manager

**Services Offered:** A full-service office, offering remote  
computing and consulting services.

**Salt Lake City, UT**

► **Bingham Computer**

**Address:** Box 1856  
601 West 19th Street  
Idaho Falls, Idaho 83401

**Telephone:** 208-522-1361

**Local Contact:** Wendell Richardson  
System Manager

**Services Offered:** RSTS/E Time-sharing with Digital  
Equipment Corporation 11/70 and 11/34's  
(Basic-Plus, Fortran) specializing in  
Job Cost, CPM and General Accounting.

**San Antonio, TX**

► **HONEYWELL DATANETWORK**

**Address:** 400 Lawndale Drive  
Salt Lake City, UT 84115

**Telephone:** (801) 487-0681

**Local  
Contact:** Data Processing

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **HONEYWELL DATANETWORK**

**Address:** 1824 E. Oltorf  
Austin, TX 78741

**Telephone:** (512) 444-1995

**Local  
Contact:** L. R. McLelland  
Branch Marketing Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

**San Diego, CA**

► **ADP NETWORK SERVICES, INC.**

**Address:** Suite 201  
3456 Camino Del Rio North  
San Diego, California 92108

**Telephone:** (714) 280-8100

**Local  
Contact:** Joe Geeb  
Division Manager

**Services  
Offered:** Remote computing service, consulting and applications programming are available from this office.

► **BOEING COMPUTER SERVICES COMPANY**

**Address:** Branch Office  
2254 Moore Street  
Suite 204  
San Diego, CA 92111

**Telephone:** (714) 294-9920

**Local  
Contact:** Kent Richardson -- Sales Representative

**Services  
Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting, education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► **HONEYWELL DATANETWORK**

**Address:** 7837 Convoy Court  
San Diego, CA 92111

**Telephone:** (714) 292-5311

**Local  
Contact:** R. C. Hum  
Branch Marketing Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.



**San Francisco,  
Oakland, CA**

► UNITED COMPUTING SYSTEMS, INC.

Address: P.O. Box 82477  
San Diego, California 92138

Telephone: (714) 292-9824

Local  
Contact: Al Clark  
Office Manager

Services  
Offered: A full-service office, offering remote  
computing and consulting services.

► ADP NETWORK SERVICES, INC.

Address: Suite 850  
100 California Street  
San Francisco, California 94111

Telephone: (415) 986-4810

Local  
Contact: Lynn Beattie  
District Manager

Services  
Offered: Full remote computing service, line  
printer, desktop plotter, Textronic  
CRT plotter, card reader, consulting  
and applications programming are  
available from this office.

► BOEING COMPUTER SERVICES COMPANY

Address: Branch Office  
310 Potrero  
Sunnyvale, CA 94086

Telephone: (408) 245-8550

Local  
Contact: Frank Wallace

Services  
Offered: Services include: timesharing, interactive &  
remote-batch; Executive Information Services;  
scientific & engineering; consulting; education  
& training; facilities mgmt.; data base mgmt.;  
both custom & packaged programs.

► COMPUTER USAGE COMPANY

Address: San Francisco Branch Office  
141 Battery Street  
San Francisco, CA 94111

Telephone: (415) 543-3940

Local  
Contact: James W. Sperry  
Marketing Manager

Services  
Offered: A full service branch office, offering  
APL time sharing, remote batch access,  
WYLBUR, card reading and printing on-site,  
customer training and seminars, applica-  
tions consulting, technical support, and  
marketing services.

► COMPUTER USAGE COMPANY

Address: San Francisco Branch Office  
141 Battery Street  
San Francisco, CA 94111

Telephone: (415) 543-3940

Local  
Contact: Peter Neofotistos  
Manager-APL Marketing

Services  
Offered: A full service branch office, offering  
APL time sharing, remote batch access,  
WYLBUR, card reading and printing on-site,  
customer training and seminars, applica-  
tions consulting, technical support, and  
marketing services.

► GENERAL ELECTRIC INFORMATION SERVICES CO.

Address: San Francisco District/Branch  
Two Embarcadero Center  
Suite 1750  
San Francisco, CA 94111

Telephone: (415) 546-4411

Local  
Contact: Branch Manager

Services  
Offered: A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** Borel Building  
120 Howard Street  
San Francisco, CA 94105

**Telephone:** (415) 957-2500

**Local  
Contact:** W. E. Vandervoort  
Branch Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **INFORMATICS INC.**

**Address:** San Francisco Sales Office  
Spear Street Tower, Suite 1018  
1 Market Plaza  
San Francisco, CA 94105

**Telephone:** (415) 777-1536

**Local  
Contact:** L. Edwards  
Branch Manager

**Services  
Offered:** A full service branch, offering interactive timesharing, remote batch (RJE), applications software services, and consulting.

► **MARTIN MARIETTA DATA SYSTEMS**

**Address:** Martin Marietta Data Systems  
Spear Street Tower  
Suite 1901  
One Market Place  
San Francisco, California 94105

**Telephone:** (213) 777-1430

**Local  
Contact:** Fred Serfas  
RCS District Manager

**Services  
Offered:** A full-service office, offering remote computing, consulting services, remote batch facilities.

► **RAPIDATA, INC.**

**Address:** District Sales Office  
120 Montgomery Street  
San Francisco, California 94104

**Telephone:** (415) 989-0640

**Local  
Contact:** Stephen Axelrod  
District Sales Manager

**Services  
Offered:** A full service district sales office providing on line solutions in the management and financial information system areas on timesharing and mini computers. Graphics, remote computing, financial data bases, M.I.S. consulting services, customer training and industry seminars.

► **ROSS SYSTEMS, INC.**

**Address:** San Francisco Office  
220 Sansome Street, Suite 208  
San Francisco, Ca 94104

**Telephone:** (415) 434-3798

**Local  
Contact:** Michael Novak  
Executive Vice President

**Services  
Offered:** A full service office offering management consulting and computer timesharing services. Specialized services for financial modeling and interactive data base management.

► **SCIENTIFIC TIME SHARING CORPORATION**

**Address:** San Francisco Branch Office  
Spear Street Tower, Suite 1601  
1 Market Plaza Building  
San Francisco, California 94105

**Telephone:** (415) 777-4357

**Local  
Contact:** Floyd Crump  
Branch Manager

**Services  
Offered:** Full-service branch office, offering remote access service, customer training and seminars, applications consulting and technical support, programming and marketing services.

► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** 525 Hearst Building  
3rd & Market Streets  
San Francisco, Calif. 94100

**Telephone:** (415) 495-6850

**Local  
Contact:** Tom Holder  
Branch Manager

**Services  
Offered:** A full-service office, offering remote computing and consulting services.

► **UNIVERSITY COMPUTING COMPANY**

**Address:** 44 Montgomery Street  
Suite 2385  
San Francisco, CA 94104

**Telephone:** (415) 421-6240

**Local  
Contact:** Dave Smiley  
Branch Manager

**Services  
Offered:** A full-service sales office offering remote computing service, card reader and high speed printer for on-site processing and technical support.

**San Jose, CA**

► GENERAL ELECTRIC INFORMATION SERVICES CO.

Address: Palo Alto Branch  
1120 San Antonio Road  
Palo Alto, CA 94303

Telephone: (415) 969-3772

Local  
Contact: Branch Manager

Services  
Offered: A full service branch office.

► COMPUTER USAGE COMPANY

Address: Sunnyvale Marketing Office  
1105 Kern Avenue  
Sunnyvale, CA 94086

Telephone: (408) 738-4300

Local  
Contact: Douglas Anderson  
West Regional Sales Manager

Services  
Offered: A full service branch office offering APL, time sharing, remote batch access, WYLBUR, card reader and printer on-site, customer training and seminars, applications consulting, technical support, and marketing services.

► HONEYWELL DATANETWORK

Address: Suite 380  
2025 Gateway Place  
San Jose, CA 95110

Telephone: (408) 998-3131

Local  
Contact: G. M. Osborne  
National Accounts Manager

Services  
Offered: Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

**Seattle,  
Everett, WA**

► ALLIED DATA

Address: P.O. Box 2406  
Olympia, WA 98507

Telephone: (206) 456-3535

Local  
Contact: Robert W. Morse  
Vice President, Marketing

Services  
Offered: A service bureau offering batch processing, distributed data processing, time sharing, consulting services, software development, and selling minicomputers and peripheral equipment for selected industries.

► ADP NETWORK SERVICES, INC.

Address: 7th and Olive  
1509 Tower Building  
Seattle, Washington 98101

Telephone: (206) 622-3218

Local  
Contact: Doug Jacobson  
District Manager

Services  
Offered: Full remote computing service, line printer, desktop plotter, paper tape reader, card reader, consulting and applications programming are available from this office.

► BOEING COMPUTER SERVICES COMPANY

Address: Branch Office  
6510 South Center Boulevard  
Seattle, Washington 98188

Telephone: (206) 773-8683

Local  
Contact: Edward Gill -- Branch Manager

Services  
Offered: Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.





► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Seattle District/Branch  
900 4th Ave.  
Suite 1218  
Seattle, WA 98164

**Telephone:** (206) 292-6851

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **HONEYWELL DATANETWORK**

**Address:** 9555 S. E. 36th Street  
Mercer Island, WA 98040

**Telephone:** (206) 233-2000

**Local  
Contact:** G. A. Roberts  
Branch Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **I.P. SHARP ASSOCIATES, INC.**

**Address:** Suite 217, Executive Plaza East,  
12835 Bellevue-Redmond Road,  
Bellevue, Washington 98005

**Telephone:** (206) 453-1661

**Local  
Contact:** Ross Hale  
Branch Manager

**Services  
Offered:** Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.

► **KEY DATA INC.**

**Address:** Home Office  
5900 First Avenue S.  
Seattle, WA 98108

**Telephone:** (206) 763-2000

**Local  
Contact:** David Stewart  
Sales Manager

**Services  
Offered:** On-line interactive, fully-integrated accounting. 24 hour service. Project management, job costing and estimating available for contractors. Hardware/software sales. Custom turnkey systems.

► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** 15436 N.E. Bellevue - Redmond Rd.  
Redmond, Washington 98053

**Telephone:** (206) 747-8981

**Local  
Contact:** Bill Harding  
Branch Manager

**Services  
Offered:** A full-service office, offering remote computing and consulting services.

► **UNIVERSITY COMPUTING COMPANY**

**Address:** 14400 Bel-Red Road  
Suite 204  
Bellevue, WA 98007

**Telephone:** (206) 643-0620

**Local  
Contact:** Ron Settimi  
District Manager

**Services  
Offered:** A full-service sales office offering remote computing service, card reader and high speed printer for on-site processing and technical support.

**Syracuse, NY**

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Syracuse Branch  
Building 2  
Electronics Park  
Syracuse, NY 13201

**Telephone:** (315) 456-3829

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

**Tampa,  
St. Petersburg, FL**

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Tampa Branch  
4950 W. Kennedy Blvd.  
Suite 605  
Tampa, FL 33609

**Telephone:** (813) 877-8294

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full service branch office.

► **UNITED COMPUTING SYSTEMS, INC.**

**Address:** Suite 518  
1000 Ashley Drive  
Tampa, Florida 33602

**Telephone:** (813) 223-3921

**Local  
Contact:** Jim Bogle  
District Manager

**Services  
Offered:** A full-service office, offering remote  
computing and consulting services.

► **AVCO COMPUTER SERVICES**

**Address:** 60 2nd Street  
Shalimar, Florida 32579

**Telephone:** (904) 651-3810

**Local  
Contact:** William Dunkelberger

**Services  
Offered:** Timesharing and remote batch processing on  
IBM equipment. CRT and drum plotting capa-  
bility. Applications software to satisfy business,  
engineering, scientific and statistical require-  
ments. Custom software engineering.

► **HONEYWELL DATANETWORK**

**Address:** 5600 Mariner Street  
Tampa, FL 33609

**Telephone:** (813) 870-0200

**Local  
Contact:** R. J. Smith  
Branch Manager

**Services  
Offered:** Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local  
branch support and a customer service  
hotline.

► **UNIVERSITY COMPUTING COMPANY**

**Address:** 9500 Koger Blvd.  
Suite 206  
St. Petersburg, FL 33702

**Telephone:** (813) 576-7373

**Local  
Contact:** Ron Pierce  
Sales Representative

**Services  
Offered:** A full-service sales office offering  
remote computing service, card reader  
and high speed printer for on-site  
processing and technical support.

**Toledo, OH MI**

► **ADP NETWORK SERVICES, INC.**

**Address:** 3103 Executive Parkway  
Toledo, Ohio 43606

**Telephone:** (419) 537-8881

**Local  
Contact:** Bob Granger  
Marketing Representative

**Services  
Offered:** Full remote computing service,  
consulting and applications  
programming are available from  
this office.

**Toronto, ONT**

► **HONEYWELL DATANETWORK**

**Address:** 4841 Monroe Street  
Toledo, OH 43623

**Telephone:** (419) 473-9721

**Local Contact:** L. T. Warner  
Res. Marketing Manager

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **CANADIAN GENERAL ELECTRIC CO. LTD.**

**Address:** 1420 Dupont Street  
Toronto M6H 2B2, Ontario

**Telephone:** (416) 534-6511

**Local Contact:** Manager Information Services

**Services Offered:** Authorized distributor of MARK III Service

► **HONEYWELL DATANETWORK**

**Address:** Honeywell Ltd.  
505 Consumers Road  
Willowdale, Ontario, Canada M2J 4V8

**Telephone:** (416) 492-0770

**Local Contact:** D. J. Bates  
Regional Director

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **I.P. SHARP ASSOCIATES LIMITED**

**Address:** 145 King Street West,  
Toronto, Ontario M5H 1J8

**Telephone:** (416) 364-5361

**Local Contact:** J. Morgan Smyth  
Branch Manager

**Services Offered:** Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.

► **OLS COMPUTER SERVICES CANADA LTD.**

**Address:** Subsidiary of ON-LINE SYSTEMS, INC.  
121 Richmond Street West  
Toronto, Ontario M5H 2K1

**Telephone:** (416) 363-8189

**Local Contact:** Branch Manager

**Services Offered:** A full-service branch office of the OLS computer services network, offering local dial up and sales and technical support.

► **UNIVERSITY COMPUTING COMPANY**

**Address:** 797 Don Mills Road, Suite 1104  
Don Mills, Ontario, Canada M3C 1V2

**Telephone:** (416) 424-4171

**Local Contact:** John Finch  
Branch Manager

**Services Offered:** A full-service sales office, offering remote computing, customer support services, card reader and high speed printer for on-site processing.



**Tulsa, OK**

▶ **HONEYWELL DATANETWORK**

**Address:** P.O. Box 2359 (1st CL) 74101  
12129 East Skelly Drive  
Tulsa, OK 74128

**Telephone:** (918) 437-5934

**Local Contact:** P. R. Isenberg  
Marketing Manager

**Services Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

▶ **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Tulsa Branch  
1900 Fourth National Bank Building  
Tulsa, OK 74119

**Telephone:** (918) 582-0800

**Local Contact:** Branch Manager

**Services Offered:** A full service branch office.

▶ **UNITED COMPUTING SYSTEMS, INC.**

**Address:** Suite 404  
16 East 16th Street  
Tulsa, Okla. 74119

**Telephone:** (918) 582-7291

**Local Contact:** Rick Wells  
Branch Manager

**Services Offered:** A full-service office, offering remote computing and consulting services.

▶ **UNIVERSITY COMPUTING COMPANY**

**Address:** 823 South Detroit  
Tulsa, OK 74120

**Telephone:** (918) 582-0975

**Local Contact:** Bob Wattam  
Acting Branch Manager

**Services Offered:** A full-service branch office offering remote computing service, card reader and high speed printer for on-site processing and technical support.

**Vancouver, BC**

▶ **BOEING COMPUTER SERVICES CANADA, LTD.**

**Address:** Branch Office  
134 Abbott Street  
Third Floor  
Vancouver, BC, Canada V6B-2K4

**Telephone:** (604) 688-2266

**Local Contact:** Darryl Conn -- Branch Manager

**Services Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

**Washington, DC MD VA**

► **AVCO COMPUTER SERVICES**

**Address:** 1025 Connecticut Avenue, N. W., Suite 1200  
Washington, D. C. 20036

**Telephone:** (202) 659-6840

**Local Contact:** Ms. Bobbie Kelly

**Services Offered:** Timesharing and remote batch processing on IBM equipment. CRT and drum plotting capability. Applications software to satisfy business engineering, scientific and statistical requirements. Custom software engineering.

► **CALLDATA SYSTEMS, INC.**

**Address:** 1800 North Kent St.  
Arlington, VA 22209

**Telephone:** (703) 527-7722

**Local Contact:** Gene Murray  
District Sales Manager

**Services Offered:** A full-service district office offering local and remote computing, interactive and batch terminals, technical support and consulting services.

► **I.P. SHARP ASSOCIATES LIMITED**

**Address:** Suite 604,  
1112 West Pender Street,  
Vancouver, B.C. V6E 2S1

**Telephone:** (604) 682-7158

**Local Contact:** John Bassingthwaight  
Branch Manager

**Services Offered:** Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.

► **ADP NETWORK SERVICES, INC**

**Address:** 1333 New Hampshire Avenue N.W.  
Washington D.C. 20036

**Telephone:** (202) 857-9000

**Local Contact:** William Brauer & Thomas Ryan  
District Managers

**Services Offered:** Special office serving the Federal Government. Full remote computing service, line printer, desktop plotter, card reader, customer training courses, consulting and applications programming are available from this office.

► **BOEING COMPUTER SERVICES COMPANY**

**Address:** Branch Office  
7980 Gallows Court  
Vienna, Virginia 22180

**Telephone:** (703) 821-6200

**Local Contact:** Robert Best -- Branch Manager

**Services Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Capital District  
Washington Branch  
1050 17th Street NW  
Suite 480  
Washington, DC 20036  
**Telephone:** (202) 223-6565

**Local Contact:** Branch Manager

**Services Offered:** A full service branch office.



► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Federal Sales District  
1050 17th St. NW  
Suite 400  
Washington, D.C. 20036

**Telephone:** (202) 467-6590

**Local  
Contact:** District Manager

**Services  
Offered:** A full service District office.

► **HONEYWELL DATANETWORK**

**Address:** 7900 Westpark Drive  
McLean, VA 22102

**Telephone:** (703) 827-3000

**Local  
Contact:** R. M. Parent  
Branch Manager

**Services  
Offered:** Interactive time sharing, remote job entry, and remote batch services with toll free nationwide access, local branch support and a customer service hotline.

► **INFORMATICS INC.**

**Address:** Washington, D.C. Sales Office  
7926 Jones Branch Drive  
Suite 272  
McLean, Virginia

**Telephone:** (703) 821-5900

**Local  
Contact:** J. Ballery  
Branch Manager

**Services  
Offered:** A full service branch, offering interactive timesharing, remote batch (RJE), applications software services, and consulting.

► **I.P. SHARP ASSOCIATES, INC.**

**Address:** Suite 307,  
1730 K Street N.W.,  
Washington, D.C. 20006

**Telephone:** (202) 293-2915

**Local  
Contact:** Karen Kreitzer  
Branch Manager

**Services  
Offered:** Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.

► **LUPPER AND LONG, INCORPORATED**

**Address:** Federal Office  
1901 North Fort Myer Drive, Suite 1105  
Arlington, Virginia 22209

**Telephone:** (703) 522-0025

**Local  
Contact:** Gary E. Long  
Vice President

**Services  
Offered:** Specializing in software products and consulting services for the interactive and remote computing markets. Products available through national time-sharing vendors or for use on in-house minis or main frames.

► **MARTIN MARIETTA DATA SYSTEMS**

**Address:** Martin Marietta Data Systems  
Federal Systems Group  
6801 Rockledge Drive  
Bethesda, Maryland 20034

**Telephone:** (301) 897-6350

**Local  
Contact:** Mr. Dan Bacot

**Services  
Offered:**

► **ON-LINE SYSTEMS, INC.**

**Address:** Silver Spring Branch Office  
962 Wayne Avenue  
Silver Spring, MD 20910

**Telephone:** (301) 585-8600

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full-service branch office of the OLS computer services network, offering local dial up and sales and technical support.

► **ON-LINE SYSTEMS, INC.**

**Address:** Washington Branch Office  
Suite 121  
444 N. Capitol Street  
Washington, D.C. 20001

**Telephone:** (202) 789-2700

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full-service branch office of the OLS computer services network, offering local dial up and sales and technical support.



► **PRC COMPUTER CENTER, INC.**

Address: 7670 Old Springhouse Road  
McLean, Virginia 22102

Telephone: (703) 893-4880

Local  
Contact: Norman Potter  
Vice President

Services: Corporate headquarter and Computer Center. An  
Offered: IBM based full services Data Center offering  
timesharing, remote batch, local batch, facilities  
management, consulting, programming data base manage-  
ment, nationwide access, data entry and technical  
support.

► **RAPIDATA, INC.**

Address: District Sales Office  
8630 Fenton Street, Suite 425  
Silver Spring, Maryland 20910

Telephone: (301) 589-2437

Local  
Contact: District Sales Manager

A full service district sales office pro-  
viding on line solutions in the manage-  
ment and financial information system  
areas on timesharing and mini computers.  
Graphics, remote computing, financial  
data bases, M.I.S. consulting services,  
customer training and industry seminars.

► **SCIENTIFIC TIME SHARING CORPORATION**

Address: Management Technology Division  
4330 East-West Highway, Suite 1111  
Bethesda, Maryland 20014

Telephone: (301) 657-8220

Local  
Contact: Donald J. Soultis

Services: Technical consulting services in the  
Offered: areas of economic analysis; optimization  
modeling; statistical forecasting and  
analysis; operations research techniques;  
systems analysis and econometric model-  
ing.

► **SCIENTIFIC TIME SHARING CORPORATION**

Address: 7316 Wisconsin Avenue  
Bethesda, Maryland 20014

Telephone: (301) 657-8220

Local  
Contact: Daniel Dyer  
President

Services: Corporate Headquarters  
Offered:

► **SCIENTIFIC TIME SHARING CORPORATION**

Address: Washington, D. C., Branch Office  
7101 Wisconsin Avenue, Suite 1414  
Bethesda, Maryland 20014

Telephone: (301) 986-1750

Local  
Contact: Robert R. Gasink  
Branch Manager

Services: Full-service branch office, offering  
Offered: remote access service, customer training  
and seminars, applications consulting  
and technical support, programming and  
marketing services.

► **SCIENTIFIC TIME SHARING CORPORATION**

Address: Communications Planning Offices  
7316 Wisconsin Avenue  
Bethesda, Maryland 20014

Telephone: (301) 657-8220

Local  
Contact: Robert L. Ellis

Services: Telecommunications and applications  
Offered: consulting, technical support, customer  
training and seminars, programming and  
marketing services.

► **SUN INFORMATION SERVICES COMPANY**

Address: Branch Office  
2000 "K" St. N.W., Suite 450W  
Washington, D.C. 20006

Telephone: (202) 466-4022

Local  
Contact: John Veach  
Branch Manager

Services: A full-service branch office, offering remote  
Offered: and interactive computing, consulting services,  
remote batch facilities, and rental of computer  
terminal equipment.

► **UNITED COMPUTING SYSTEMS, INC.**

Address: Suite 250  
7700 Leesburg Pike  
Falls Church, VA 22043

Telephone: (703) 821-1022

Local  
Contact: Larry Ferguson  
District Manager

Services: A full-service office, offering remote  
Offered: computing and consulting services.



**Winnipeg, MAN**

► **UNIVERSITY COMPUTING COMPANY**

**Address:** 7777 Leesburg Pike  
Suite 219  
Falls Church, VA 22043

**Telephone:** (703) 790-9414

**Local Contact:** Scott Walker, Sales Representative  
Dick Davis, Customer Support Rep

**Services Offered:** A full-service sales office offering remote computing service, card reader, and high speed printer for on-site processing and customer support

► **I.P. SHARP ASSOCIATES LIMITED**

**Address:** Suite 909,  
213 Notre Dame Avenue,  
Winnipeg, Manitoba R3B 1N3

**Telephone:** (204) 947-1241

**Local Contact:** Robin Chesters  
Branch Manager

**Services Offered:** Computer time-sharing and systems consulting with full service facilities for customer training, seminars, technical support and programming.

**ALASKA**

► **BOEING COMPUTER SERVICES COMPANY**

**Address:** Branch Office  
3230 C Street  
Anchorage, Alaska 99503

**Telephone:** (907) 278-1511

**Local Contact:** George Sickel -- Branch Manager

**Services Offered:** Services include: timesharing, interactive & remote-batch; Executive Information Services; scientific & engineering; consulting; education & training; facilities mgmt.; data base mgmt.; both custom & packaged programs.

► **GENERAL ELECTRIC INFORMATION SERVICES CO.**

**Address:** Anchorage Branch  
517 W. Northern Lights Blvd.  
Anchorage AL 99503

**Telephone:** (907) 277-2317

**Local Contact:** Branch Manager

**Services Offered:** A full service branch office.

**AUSTRALIA**

► I.P. SHARP ASSOCIATES PTY. LTD.

Address: 36 Elizabeth Street,  
South Yarra, Victoria  
Australia 3141

Telephone: (03) 244-417

Local  
Contact: Vim Bendall  
Branch Manager

Services  
Offered: Computer time-sharing and systems  
consulting.

► I.P. SHARP ASSOCIATES PTY. LTD.

Address: Suite 1342,  
175 Pitt Street,  
Sydney, N.S.W. Australia 2000

Telephone: (02) 232-5914

Local  
Contact: Chris Sanderson  
District Manager

Services  
Offered: Computer time-sharing and systems  
consulting.

**AUSTRIA**

► GE INFORMATIONS-SERVICE Ges. mbH

Address: Storchengasse 1  
A-1150 Vienna

Telephone: (0222) 85.35.05

Local  
Contact: Sales manager

Services  
Offered: Authorized distributor of the MARK III  
Service Network.

► GE INFORMATIONS-SERVICE GmbH

Address: Luxemburger Strasse 299  
5000 Koeln 41

Telephone: (0221) 414091

Local  
Contact: General Manager

Services  
Offered: Authorized distributor of the MARK III  
Service Network.

► I.P. Sharp Ges.mbh

Address: Rechte Wienzeile 5/11  
1040 Wien, Austria

Telephone: (222) 576-571

Local  
Contact: G. Bach  
Branch Manager

Services  
Offered: Computer time-sharing and systems  
consulting.





**BELGIUM**

▶ **ADP NETWORK SERVICES, INC.**

**Address:** Rue de Livourne 7  
Box 4  
B-1050 Brussels  
Belgium

**Telephone:** 02-538.89.62/538.91.47

**Local  
Contact:**

**Services  
Offered:** Full remote computing services,  
program development, and consulting  
are available from this office.

▶ **ADP NETWORK SERVICES, INC.**

**Address:** Frankrijklei 112-114  
Box 3  
Antwerp 2000  
Belgium

**Telephone:** 031-313636/334450

**Local  
Contact:**

**Services  
Offered:** Full remote computing services,  
program development, and consulting  
are available from this office.

▶ **GENERAL TIME-SHARE S.A.**

**Address:** Avenue Des Arts 56  
1040 Brussels

**Telephone:** (02) 511.07.40

**Local  
Contact:** Marketing Manager

**Services  
Offered:** Authorized distributor of the MARK III  
Services Network.

▶ **I.P. Sharp Europe S.A.**

**Address:** Avenue General de Gaulle, 39  
1050 Brussels  
Belgique

**Telephone:** (02) 649 99 77

**Local  
Contact:** Pam Cocks  
Branch Manager

**Services  
Offered:** Computer time-sharing and systems  
consulting.

**DENMARK**

▶ **I.P. Sharp ApS**

**Address:** Ostergade 24B  
1100 Copenhagen K  
Denmark

**Telephone:** (01) 112 434

**Local  
Contact:** J. Larsen  
Branch Manager

**Services  
Offered:** Computer time-sharing and systems  
consulting.

**FINLAND**

► ØK DATA

Address: Grønningen 17  
1270 Copenhagen K.

Telephone: (01) 12 32.00

Local  
Contact: Deldata Manager

Services  
Offered: Authorized distributor of the MARK III  
Service Network.

► OY NOKIA AB ELEKTRONIIKKA

Address: Laskentakeskus  
Opastinsilta 8E  
00520 Helsinki 52

Telephone: (90) 14 00 22

Local  
Contact: Sales Manager, Time Sharing

Services  
Offered: Authorized distributor of the MARK III  
Service Network

**FRANCE**

► GENERAL ELECTRIC INFORMATION SERVICES SA

Address: 19, Avenue Leon Gambetta  
BP 338  
92541 Montrouge Cedex

Telephone: (1) 657 14 22

Local  
Contact: Sales Manager

Services  
Offered: Authorized distributor of the MARK III  
Service Network.

► SCIENTIFIC TIME SHARING CORPORATION

Address: Société de Traitments et de Services  
Conversationnels  
Tour Neptune  
Cedex No. 20  
92086 - Paris la Defense France

Telephone: 773-7964

Local  
Contact: Patrick Baudouin

Services  
Offered: Full-service office, offering remote  
access service, customer training  
and seminars, applications consulting  
and technical support, programming and  
marketing services.

► Societe I.P. Sharp SARL

Address: Tour Neptune - Cedex No. 20,  
92086 Paris-la-defense  
France

Telephone: (1) 773 57 77

Local  
Contact: T. Cureton  
Branch Manager

Services  
Offered: Computer time-sharing and systems  
consulting.

**GERMANY**

► **ADP NETWORK SERVICES, INC.**

**Address:** Moltkestr 59  
4300 Essen 1  
West Germany

**Telephone:** 0201-274064

**Local  
Contact:**

**Services  
Offered:** Full remote computing services,  
program development, and consulting  
are available from this office.

► **ADP NETWORK SERVICES, INC.**

**Address:** Lyoner Str. 36  
6000 Frankfurt 71  
West Germany

**Telephone:** 0611-664081

**Local  
Contact:**

**Services  
Offered:** Full remote computing services,  
program development, and consulting  
are available from this office.

► **I.P. Sharp GmbH**

**Address:** Leostrasse 62A  
4000 Dusseldorf 11  
West Germany

**Telephone:** (0211) 57 50 16

**Local  
Contact:** G.H. Robinson  
Branch Manager

**Services  
Offered:** Computer time-sharing and systems  
consulting.

► **SCIENTIFIC TIME SHARING CORPORATION**

**Address:** APL\*PLUS International  
(Deutschland) GmbH  
Cecilienalle 68, 4000 Düsseldorf 30  
West Germany

**Telephone:** (0211) 45-06-01

**Local  
Contact:** Michael Hardwidge

**Services  
Offered:** Full-service office, offering remote  
access service, customer training  
and seminars, applications consulting  
and technical support, programming and  
marketing services.

**IRELAND**

► **GEISCO, LTD.**

**Address:** 29-31 South William Street  
Dublin 2

**Telephone:** Dublin 772641

**Local  
Contact:** Sales Manager, Time Sharing

**Services  
Offered:** Authorized distributor of the MARK III  
Service Network.



**ITALY**

▶ **ADP NETWORK SERVICES, INC.**

Address: Via Medardo Rosso 16  
20159 Milan  
Italy

Telephone: 02-225310/225778

Local  
Contact:

Services Offered: Full remote computing services,  
program development, and consulting  
are available from this office.

▶ **ADP NETWORK SERVICES, INC.**

Address: Viale Regina Margherita, 269  
00187 Rome  
Italy

Telephone: 06-865916/8441435

Local  
Contact:

Services Offered: Full remote computing services,  
program development, and consulting  
are available from this office.

▶ **GE INFORMATION SERVICES SpA**

Address: Via M. Gioia 70  
20125-Milano

Telephone: (02) 69 77 215

Local  
Contact: Sales Manager

Services Offered: Authorized distributor of the MARK III  
Service Network.

**JAPAN**

▶ **INFO. SERVICES INT'L-DENTSU, LTD.**

Address: Kosan #2 Building  
1-7-13 Tsukiji  
Chuo-Ku, Tokyo 104

Telephone: (03) 544-7257

Local  
Contact: Sales Manager

Services Offered: Authorized distributor of the MARK III  
Service Network.

**MEXICO**

▶ **TIEMPO COMPARTIDO, S.A.**

Address: Paseo de la Reforma 300 12 PISO  
Mexico 6, D.F.

Telephone: (905) 525-9040

Local  
Contact: Sales Manager

Services Offered: Authorized distributor of the MARK III  
Service Network.

## NETHERLANDS

### ▶ ADP NETWORK SERVICES, INC.

Address: J. C. van Markenlaan 3  
Postbus 286  
2285 VL Rijswijk  
The Netherlands

Telephone: 070-948866

Local  
Contact:

Services  
Offered: Full remote computing services,  
program development, and consulting  
are available from this office.

### ▶ ADP NETWORK SERVICES, INC.

Address: Populierenlaan 595  
1185 SX Amstelveen  
The Netherlands

Telephone: 020-415156

Local  
Contact:

Services  
Offered: Full remote computing services,  
program development, and consulting  
are available from this office.

### ▶ ATKINS ON-LINE BV

Address: Subsidiary of ON-LINE SYSTEMS, INC.  
The Hague, Netherlands  
Banstraat 2  
2517 GJ 's-Gravenhage  
Nederland

Telephone:

Local  
Contact: Branch Manager

Services  
Offered: A full-service branch office of the OLS  
computer services network, offering  
local dial up and sales and technical  
support.

### ▶ GENERAL ELECTRIC INFORMATION SERVICES BV

Address: Kabelweg 37  
1014 BA Amsterdam

Telephone: (020) 84 68 25

Local  
Contact: Marketing Manager

Services  
Offered: Authorized distributor of the MARK III  
Service Network.

### ▶ Intersystems B.V.

Address: Herengracht 244,  
1016 BT Amsterdam  
The Netherlands

Telephone: (020) 24 40 50

Local  
Contact: Laurie J. Howard  
Branch Manager

Services  
Offered: Computer time-sharing and systems  
consulting with full service facilities  
for customer training, seminars,  
technical support and programming.

## NORWAY

### ▶ GE (USA) INFORMATION SERVICES A/S

Address: Roald Amundsens Gate 2  
Postboks 1770 Vika  
Oslo 1, Norway

Telephone: (02) 41-80-30

Local  
Contact: Sales Manager

Services  
Offered: Authorized distributor of the MARK III  
Service Network.

**PUERTO RICO**

► **I.P. Sharp A/S**

**Address:** Postboks 1470, Vika  
Oslo 1, Norway

**Telephone:** (02) 41 17 88

**Local  
Contact:** D. Bonyun  
Branch Manager

**Services  
Offered:** Computer time-sharing and  
systems consulting.

► **GENERAL ELECTRIC TECHNICAL SERVICES CO.**

**Address:** Banco de Ponce Building, #804  
268 Munoz Rivera Avenue  
Hato Rey, Puerto Rico 00918

**Telephone:** (809) 759-8100

**Local  
Contact:** Manager - Information Services

**Services  
Offered:** Authorized distributor of the MARK III  
Service Network.

► **HONEYWELL DATANETWORK**

**Address:** Caparra Heights  
Tabonuco 7 8  
Guaynabo, PR 00920

**Telephone:** (809) 792-7075

**Local  
Contact:** A. Ruiz  
Res. Marketing Manager

**Services  
Offered:** Interactive time sharing, remote job  
entry, and remote batch services with  
toll free nationwide access, local  
branch support and a customer service  
hotline.

**SPAIN**

► **GE (U.S.A.) INFORMATION SERVICES, SA**

**Address:** Petro Teixeira 8  
Madrid 20

**Telephone:** (1) 4.55.48.49

**Local  
Contact:** General Manager

**Services  
Offered:** Authorized distributor of the MARK III  
Service Network.



**SWEDEN**

► **SCIENTIFIC TIME SHARING CORPORATION**

**Address:** APL\*PLUS International, S.A.  
Doctor Fleming  
35 - Primero D, Madrid 16, Spain

**Telephone:** 457-6266

**Local  
Contact:** Jose T. Sellers

**Services  
Offered:** Full-service office, offering remote  
access service, customer training  
and seminars, applications consulting  
and technical support, programming and  
marketing services.

► **GE (U.S.A.) INFORMATION SERVICES AB**

**Address:** Vretenvagen 13  
Box 1163  
S 171 54 Solna

**Telephone:** (08) 98 52 30

**Local  
Contact:** Sales Manager

**Services  
Offered:** Authorized distributor of the MARK III  
Service Network.

► **I.P. Sharp AB**

**Address:** Kungsgatan 65  
S111 22 Stockholm,  
Sweden

**Telephone:** (08) 21 10 19

**Local  
Contact:** H. Carim  
Branch Manager

**Services  
Offered:** Computer time-sharing and systems  
consulting.

**SWITZERLAND**

► **GENERAL ELECTRIC INFORMATION SERVICES AG**

**Address:** Bergstrasse 138  
8032 Zurich

**Telephone:** (01) 55 48 65

**Local  
Contact:** Sales Manager

**Services  
Offered:** Authorized distributor of the MARK III  
Service Network.



► I.P. Sharp A.G.

Address: Badenerstrasse 141  
8004 Zurich  
Switzerland

Telephone: 241 52 42

Local  
Contact: M. Riedel  
Branch Manager

Services  
Offered: Computer time-sharing and systems  
consulting.

► UNITED COMPUTING SYSTEMS, INC.

Address: FIDES  
P.O. Box 656  
8027 Zurich  
Switzerland

Telephone: (011-411) 202-7840

Local  
Contact: Matt Szilas  
APEX Sales Manager

Services  
Offered: A full-service office, offering remote  
computing and consulting services.

**UNITED KINGDOM**

► ADP NETWORK SERVICES, INC.

Address: 142 Great Portland Street  
London W1N 5TA  
England

Telephone: 01-580 3175

Local  
Contact:

Services  
Offered: Full remote computing services,  
program development, and consulting  
are available from this office.

► ADP NETWORK SERVICES, INC.

Address: Kimberley House  
Vaughan Way  
Leicester LE1 4SG  
England

Telephone: 0533-24604/5

Local  
Contact:

Services  
Offered: Full remote computing services,  
program development, and consulting  
are available from this office.

► ADP NETWORK SERVICES, INC.

Address: 179/193 Great Portland Street  
London W1N 5TA  
England

Telephone: 01-637 1355

Local  
Contact:

Services  
Offered: Full remote computing services,  
program development, and consulting  
are available from this office.

► ADP NETWORK SERVICES, INC.

Address: Ellerd House  
68-72 Stuart Street  
Luton, LU1 2SW  
Bedfordshire  
England

Telephone:

Local  
Contact:

Services  
Offered: Full remote computing services,  
program development, and consulting  
are available from this office.



► ADP NETWORK SERVICES, INC.

Address: Peter House  
St. Peter's Square  
Oxford Street  
Manchester M1 5AW  
England  
Telephone: 061-236 9121

Local  
Contact:

Services  
Offered: Full remote computing services,  
program development, and consulting  
are available from this office

► ADP NETWORK SERVICES, INC.

Address: Dudley House  
Albion Street  
Leeds LS2 8PN  
England  
Telephone: 0532 460636

Local  
Contact:

Services  
Offered: Full remote computing services,  
program development, and consulting  
are available from this office.

► ADP NETWORK SERVICES, INC.

Address: 418-420 Coopers Buildings  
Church Street  
Liverpool L1 3AG  
England  
Telephone: 051-708 7138

Local  
Contact:

Services  
Offered: Full remote computing services,  
program development, and consulting  
are available from this office.

► ADP NETWORK SERVICES, INC.

Address: Edmund House  
Newhall Street  
Birmingham B3 3EW  
England  
Telephone: 021-236 1831

Local  
Contact:

Services  
Offered: Full remote computing services,  
program development, and consulting  
are available from this office.

► ADP NETWORK SERVICES, INC.

Address: General Buildings  
33-49 Victoria Street  
Bristol BS1 6AW  
England  
Telephone: 0272 20363

Local  
Contact:

Services  
Offered: Full remote computing services,  
program development, and consulting  
are available from this office.

► ADP NETWORK SERVICES, INC.

Address: Heathrow House  
Bath Road  
Cranford  
Hounslow, Middlesex TW5 9QH  
England  
Telephone: 01-897 7615/759 9191

Local  
Contact:

Services  
Offered: Full remote computing services,  
program development, and consulting  
are available from this office.

► ADP NETWORK SERVICES, INC.

Address: Agriculture House  
Stone Bridge  
Durham City DH1 3RY  
England  
Telephone: 0385 65214

Local  
Contact:

Services  
Offered: Full remote computing services,  
program development, and consulting  
are available from this office.

► ADP NETWORK SERVICES, INC.

Address: 57 Melville Street  
Edinburgh EH3 7HL  
Scotland  
Telephone: 031-225 1587

Local  
Contact:

Services  
Offered: Full remote computing services,  
program development, and consulting  
are available from this office.



► **ADP NETWORK SERVICES, INC.**

**Address:** Park House  
Park Circus Place  
Glasgow G3 6AH  
Scotland

**Telephone:** 041-331 2358

**Local  
Contact:**

**Services  
Offered:** Full remote computing services,  
program development, and consulting  
are available from this office.

► **ATKINS ON-LINE LIMITED**

**Address:** Subsidiary of ON-LINE SYSTEMS, INC.  
Fourmost House  
12-22 West Street  
Epsom, Surrey KT18 7RH  
United Kingdom

**Telephone:** 44-3727-29678

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full-service branch office of the OLS  
computer services network, offering  
local dial up and sales and technical  
support.

► **BOEING COMPUTER CENTRES, LTD.**

**Address:** Branch Office  
31 Clarendon Road  
St. Martin's House  
Watford, Herts., England WD1 1JA

**Telephone:** 011-44-923-3821

**Local  
Contact:** Peter C. Hooper -- Managing Director

**Services  
Offered:** Services include: timesharing, interactive &  
remote-batch; Executive Information Services;  
scientific & engineering; consulting; education  
& training; facilities mgmt.; data base mgmt.;  
both custom & packaged programs.

► **GE INFORMATION SERVICES, PTY. LIMITED**

**Address:** 16th Floor  
61 Lavender Street  
Milsons Point, NSW 2061

**Telephone:** (02) 436-1144

**Local  
Contact:** Manager

**Services  
Offered:** Authorized distributor of the MARK III  
Service Network.

► **GEISCO LIMITED**

**Address:** 114-118 Southampton Row  
London WC1B 5AB

**Telephone:** (01) 242 5725

**Local  
Contact:** Manager

**Services  
Offered:** Authorized distributor of the MARK III  
Service Network.

► **I.P. SHARP ASSOCIATES LIMITED**

**Address:** 132 Buckingham Palace Road,  
London SW1W 9SA, England

**Telephone:** (01) 730-0361

**Local  
Contact:** Fred J. Perkins,  
Managing Director

**Services  
Offered:** Computer time-sharing and systems  
consulting with full service facilities  
for customer training, seminars,  
technical support and programming.

► **OLS COMPUTER SERVICES (UK) LIMITED**

**Address:** Subsidiary of ON-LINE SYSTEMS, INC.  
6/24 Southgate Road  
London N13JJ ENGLAND

**Telephone:** 01-249-6031

**Local  
Contact:** Branch Manager

**Services  
Offered:** A full-service branch office of the OLS  
computer services network, offering  
local dial up and sales and technical  
support.

► **RAPIDATA, INC.**

**Address:** Rapidata, International Ltd.  
Noritake House  
2 York Street  
London W1H 1FA, United Kingdom

**Telephone:** 01-935-8355

**Local  
Contact:** John Clarke  
District Manager

**Services  
Offered:** A full service district sales office pro-  
viding on line solutions in the manage-  
ment and financial information system  
areas on timesharing and mini computers.  
Graphics, remote computing, financial  
data bases, M.I.S. consulting services,  
customer training and industry seminars.



► SCIENTIFIC TIME SHARING CORPORATION

Address: APL\*PLUS Limited  
50-52 Chancery Lane  
London WC2A 1HL England

Telephone: 01-242-8135

Local  
Contact: Michael Branson

Services  
Offered: Full-service office, offering remote  
access service, customer training  
and seminars, applications consulting  
and technical support, programming and  
marketing services.

► UNITED COMPUTING SYSTEMS, INC.

LUCS  
Address: United House  
56-64 Leonard Street  
London EC2 4AN  
ENGLAND

Telephone: (01) 253-1066

Local  
Contact: Mike Dixon  
European Sales Manager

Services  
Offered: A full-service office, offering remote  
computing and consulting services.

► GENERAL ELECTRIC DE VENEZUELA

Address: Sabana Grande  
Apartido 166 -- Zona Postal 101  
Caracas

Telephone: 71 98 11, ext. 127

Local  
Contact: Manager

Services  
Offered: Authorized distributor of the MARK III  
Service Network.



# GEOGRAPHIC DIRECTORY

## Toll-Free Reference Chart for Remote Computing Services

XX.073

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
Akron, OH	ADP Network Services, Inc.	•	10, 30					Cleveland, OH
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Dayton, OH
	Boeing Computer Services Co.	•	200, 240, 480	•				Cleveland, OH
	CallData Systems, Inc.	•	10, 15, 30					Chicago, IL
	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•				Cleveland, OH
	Data Resources, Inc.	•	10, 30	•				Pittsburgh, PA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Cleveland, OH
	Honeywell DATANETWORK	•	10, 30, 120, Others					Cleveland, OH
	Informatics Inc.	•	10, 15, 30	•			•	Fairfield, NJ
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL
	Interactive Market Systems, Inc.	•	10, 30	•				Chicago, IL
	National CSS, Inc.	•	30					Cleveland, OH
	On-Line Systems, Inc.	•	10, 14.8, 15, 30					Cleveland, OH
Albany, Schenectady, Troy, NY	Rapidata, Inc.	•	10, 15, 30, 60, 120					Chicago, IL
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Chicago, IL
	Service Bureau Company	•	10, 15, 30, 250, 600	•	•		•	Cleveland, OH
	University Computing Co.	•	30, Others	•				Chicago, IL
	Warner Computer Systems, Inc.	•	10, 30, 120	•				Detroit, MI
								New York, NY
	ADP Network Services, Inc.	•	10, 30					New York, NY
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	120	•				Wellesley, MA
	Bowne Information System, Inc.	•	15, 30					New York, NY
	CallData Systems, Inc.	•	10, 15, 30					New York, NY
	Citishare	•	30, 120					New York, NY
	Data Resources, Inc.	•	30	•				New York, NY
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				New York, NY
	Honeywell DATANETWORK	•	10, 30, 120, Others		•			New York, NY
Allentown, Bethlehem, Easton, PA-NJ	Informatics Inc.	•	10, 15, 30	•			•	New York, NY
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				New York, NY
	National CSS, Inc.	•	120					New York, NY
	On-Line Systems, Inc.	•	10, 14.8, 15, 30					New York, NY
	Rapidata, Inc.	•	10, 15, 30, 60, 120					Stamford, CT
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Rochester, NY
	Service Bureau Company	•	30, 250, 600	•				New York, NY
	University Computing Co.	•	30, Others	•				Boston, MA
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
								New York, NY
	ADP Network Services, Inc.	•	10, 30					Philadelphia, PA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	200, 240, 480	•				Philadelphia, PA
	CallData Systems, Inc.	•	10, 15, 30					Philadelphia, PA
	Citishare	•	30, 120					New York, NY
	Data Resources, Inc.	•	30	•				Pittsburgh, PA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Philadelphia, PA
	Honeywell DATANETWORK	•	10, 30, 120, Others		•			
	Informatics Inc.	•	10, 15, 30	•			•	Fairfield, NJ
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Neptune, NJ
	National CSS, Inc.	•	10, 13.4, 30					Philadelphia, PA
	On-Line Systems, Inc.	•	10, 14.8, 15, 30					Philadelphia, PA
	Pentamation Ent., Inc.	•	10, 13.4, 15, 30		•	4		
	Rapidata, Inc.	•	10, 15, 30, 60, 120					
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Philadelphia, PA
	Service Bureau Company	•	10, 15, 30, 250, 600	•				Philadelphia, PA
	Time Sharing Resources	•	30, Others	•	•	6	•	Philadelphia, PA

(Continued...)





# Toll-Free Reference Chart for Remote Computing Services

**XX.074**

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
<b>Anaheim, Santa Ana, Garden Grove, CA</b>	University Computing Co.	•	30, Others	•				Philadelphia, PA
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30					Los Angeles, CA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Los Angeles, CA
	Boeing Computer Services Co.	•	200, 240, 480	•				El Segundo, CA
	CallData Systems, Inc.	•	10, 15, 30					Los Angeles, CA
	Computer Usage Company	•	10, 15, 30, Others	•	•	3		
	CSC/INFONET	•	10, 14.8, 30, 120, 480					Newport Beach, CA
	Data Resources, Inc.	•	30	•				San Francisco, CA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Los Angeles, CA
<b>Atlanta, GA</b>	Honeywell DATANETWORK	•	10, 30, 120, Others		•			
	Informatics Inc.	•	10, 15, 30, Others	•	•		•	Chicago, IL
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Newport Beach, CA
	National CSS, Inc.	•	10, 13.4, 30				•	Los Angeles, CA
	On-Line Systems, Inc.	•	10, 30					Los Angeles, CA
	Rapidata, Inc.	•	10, 15, 30, 60, 120					Los Angeles, CA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Los Angeles, CA
	Service Bureau Company	•	10, 15, 30, 250, 600	•				Los Angeles, CA
	University Computing Co.	•	30, Others	•				El Segundo, CA
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
<b>Baltimore, MD</b>	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	Wilmington, MA
	Avco Computer Services	•	10, 15, 30, 120, Others	•		7		
	Boeing Computer Services Co.	•	10, 15, 30, 120, Others	•	•	7		
	Bowne Information Systems, Inc.	•	15, 30	•	•	5		
	CallData Systems, Inc.	•	10, 15, 30, 120	•	•			New York, NY
	Citishare	•	30, 120					
	Computer Usage Company	•	10, 15, 30, Others	•	•	2	•	
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			Washington, D.C.
	Data Resources, Inc.	•	30, 120	•				
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			McLean, VA
<b>Baltimore, MD</b>	Honeywell DATANETWORK	•	10, 30, 120, Others		•			Neptune, NJ
	Informatics Inc.	•	10, 15, 30, Others	•			•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				
	Interactive Data Corporation	•	30	•	•		•	
	Interactive Market Systems, Inc.	•	10, 30	•	•	1	•	
	I.P. Sharp Associates, Inc.	•	15, 30, 120	•	•	2		
	Martin Marietta Data Systems	•	30, 120, 240, 480	•	•	6	•	
	McDonnell Douglas	•	10, 30, 120, Others	•	•	15	•	
	National CSS, Inc.	•	120, 30, Others				•	
	On-Line Systems, Inc.	•	10, 15, 30, 120, Others	•	•	5	•	
<b>Baltimore, MD</b>	Rapidata, Inc.	•	10, 15, 30, 60, 120	•	•	9	•	
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Chapel Hill, NC
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•	
	Time Sharing Resources	•	30, Others	•	•	5	•	
	United Computing Systems	•	10, 30, 120, Others	•	•			
	University Computing Co.	•	30, 120, Others	•				St. Petersburg, FL
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30	•	•			Wilmington, MA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Vienna, VA
	Boeing Computer Services Co.	•	10, 30, Others	•				Washington, D.C.
<b>Baltimore, MD</b>	Bowne Information Systems, Inc.	•	15, 30					Washington, D.C.
	CallData Systems, Inc.	•	10, 15, 30					New York, NY
	Citishare	•	30, 120					
								(Continued...)



# Toll-Free Reference Chart for Remote Computing Services

XX.075

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
Birmingham, AL	Computer Usage Company	•	10, 15, 30, Others	•				New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•				Washington, D.C.
	Data Resources, Inc.	•	30	•				Washington, D.C.
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•	•		•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Neptune, NJ
	Interactive Market Systems, Inc.	•	10, 30	•				New York, NY
	Martin Marietta Data Systems	•	30, 120, 240, 480	•	•	10	•	
	National CSS, Inc.	•	10, 13.4, 30	•				Washington, D.C.
	On-Line Systems, Inc.	•	10, 14.8, 30, Others	•				Silver Springs, MD
	Rapidata, Inc.	•	10, 15, 30, 60, Others	•				Washington, D.C.
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Bethesda, MD
	Service Bureau Company	•	10, 15, 30, 250, 600	•	•		•	
	Time Sharing Resources	•	30, Others	•	•	6	•	
	University Computing Co.	•	30, Others	•				Falls Church, VA
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30	•				Atlanta, GA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Huntsville, AL
	Boeing Computer Services Co.	•	200, 240, 480	•				Atlanta, GA
	CallData Systems, Inc.	•	10, 15, 30	•				Atlanta, GA
	Citishare	•	30, 120	•				New York, NY
	Computer Usage Company	•	10, 15, 30, Others	•				Atlanta, GA
	Data Resources, Inc.	•	30	•				Houston, TX
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	McLean, VA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Neptune, NJ
	Interactive Market Systems, Inc.	•	10, 30	•				Atlanta, GA
	National CSS, Inc.	•	120, 30, Others	•				Atlanta, GA
	On-Line Systems, Inc.	•	10, 30	•				Atlanta, GA
	Rapidata, Inc.	•	10, 15, 30, 60, Others	•				Atlanta, GA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Chapel Hill, NC
	Service Bureau Company	•	10, 15, 30, 250, 600	•				Atlanta, GA
	University Computing Co.	•	30, Others	•				St. Petersburg, FL
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	
	Avco Computer Services	•	10, 15, 30, 120, Others	•	•	90	•	
	Boeing Computer Services Co.	•	30, 200, 240, 480	•	•	7	•	
	Bowne Information Systems, Inc.	•	15, 30, 120	•	•	7	•	
	CallData Systems, Inc.	•	10, 15, 30, 120	•	•	15	•	
	Citishare	•	30, 120	•				New York, NY
	Computer Usage Company	•	10, 15, 30, Others	•	•	1	•	
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•	
	Data Resources, Inc.	•	30, 120	•	•	30	•	
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•				Wellsley Hills, MA
	Informatics Inc.	•	10, 15, 30, Others	•			•	New York, NY
	INSCO Systems	•	10, 14.7, 15, 30, 120	•			•	New York, NY
	Interactive Data Corporation	•	10, 15, 30, 120, Others	•	•			
	Interactive Market Systems, Inc.	•	10, 30	•				New York, NY
	I.P. Sharp Associates, Inc.	•	15, 30, 120	•	•	3		
	McDonnell Douglas	•	10, 30, 120, Other	•	•	5		
(Continued...)								

**Toll-Free Reference Chart  
for  
Remote Computing Services**

XX.076

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
Buffalo, NY	National CSS, Inc.	•	120, 480, Others				•	Cambridge, MA
	On-Line Systems, Inc.	•	10, 14.8, 15, 30, 120, Other	•	•	10	•	
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•	•	11	•	
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•	•	6	•	
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•	
	Sun Information Services Co.	•	10, 15, 30, 120, Others	•	•	2	•	
	Time Sharing Resources	•	30, Others	•	•	4	•	
	United Computing Systems	•	10, 30, Others	•	•		•	
	University Computing Co.	•	30, 120, Others	•	•	2	•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•				Stamford, CT
Buffalo, NY	ADP Network Services, Inc.	•	10, 30, 120	•	•			
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	30, 200, 240, 480	•				New York, NY
	Bowne Information Systems, Inc.	•	15, 30					New York, NY
	CallData Systems, Inc.	•	10, 15, 30					New York, NY
	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					New York, NY
	Data Resources, Inc.	•	30	•				New York, NY
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	New York, NY
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				New York, NY
	National CSS, Inc.	•	30					Stamford, CT
	On-Line Systems, Inc.	•	10, 15, 30, Others		•	2		
	Rapidata, Inc.	•	10, 15, 30, Others					Boston, MA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Boston, MA
	Service Bureau Company	•	10, 15, 30, 250, 600	•				Rochester, NY
	University Computing Co.	•	30, Others					New York, NY
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
Charlotte, Gastonia, NC	ADP Network Services, Inc.	•	10, 30					Atlanta, GA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	200, 240, 480	•				Atlanta, GA
	CallData Systems, Inc.	•	10, 15, 30					Washington, D.C.
	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					Atlanta, GA
	Data Resources, Inc.	•	30	•				Washington, D.C.
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	McLean, VA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Neptune, NJ
	National CSS, Inc.	•	200, 10, 13.4, 30				•	
	On-Line Systems, Inc.	•	10, 30					Washington, D.C.
	Rapidata, Inc.	•	10, 15, 30, 60, Others					Atlanta, GA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•			•	Chapel Hill, NC
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•			
	United Computing Systems	•	10, 30		•			
	University Computing Co.	•	30, Others	•				Falls Church, VA
	Warner Computer Systems, Inc.	•	10, 30, 120					New York, NY
Chicago, IL	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	10, 15, 30, 120, Others	•	•	16	•	
	Bowne Information Systems, Inc.	•	15, 30, 120		•	11		

(Continued...)

**Toll-Free Reference Chart  
for  
Remote Computing Services**

XX.077

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY	
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •		
Cincinnati, OH-KY-IN	CallData Systems, Inc.	•	10, 15, 30, 120	•	•	7	•	New York, NY New York, NY	
	Citishare	•	30, 120	•	•		•		
	Computer Usage Company	•	10, 15, 30, Others	•	•		•		
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•		
	Data Resources, Inc.	•	30, 120	•	•	20	•		
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•		•		
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•		•		
	Informatics Inc.	•	10, 15, 30, Others	•	•		•		
	INSCO Systems	•	10, 14.7, 15, 30, 120	•	•		•		
	Interactive Data Corporation	•	10, 15, 20, 120, Others	•	•		•		
	Interactive Market Systems, Inc.	•	10, 30	•	•	2	•		
	I.P. Sharp Associates, Inc.	•	15, 30, 120	•	•	5	•		
	Martin Maretta Data Systems	•	30, 120, 240, 480	•	•	5	•		
	McDonnell Douglas	•	10, 30, 120, Others	•	•	25	•		
	National CSS, Inc.	•	10, 13.4, Others	•	•		•		
	On-Line Systems, Inc.	•	10, 14.8, 15, 30, 120, Other	•	•	12	•		
	Rapidata, Inc.	•	10, 15, 30, 60, Others	•	•	9	•		
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•	•	8	•		
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•		
	United Computing Systems	•	10, 30, 120, Others	•	•		•		
	University Computing Co.	•	30, 120, Others	•	•	14	•		
	Warner Computer Systems, Inc.	•	10, 30, 120	•	•		•	New York, NY	
	Cincinnati, OH-KY-IN	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	Wilmington, MA Dearborn, MI Philadelphia, PA Chicago, IL New York, NY New York, NY
		Avco Computer Services	•	10, 15, 30, 120, Others	•	•		•	
		Boeing Computer Services Co.	•	30, 120, 200, 240, 480	•	•		•	
		Bowne Information Systems, Inc.	•	15, 30	•	•		•	
		CallData Systems, Inc.	•	10, 15, 30	•	•		•	
		Citishare	•	30, 120	•	•		•	
		Computer Usage Company	•	10, 15, 30, Others	•	•		•	
		CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•	
		Data Resources, Inc.	•	30	•	•		•	
		General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•		•	
		Honeywell DATANETWORK	•	10, 30, 120, Others	•	•		•	
		Informatics Inc.	•	10, 15, 30	•	•		•	
INSCO Systems		•	10, 14.7, 15, 30, 120	•	•		•		
McDonnell Douglas		•	10, 30, 120, Others	•	•	5	•		
National CSS, Inc.		•	120, 30, Others	•	•		•		
On-Line Systems, Inc.		•	10, 14.8, 15, 30	•	•		•		
Rapidata, Inc.		•	10, 15, 30, 60, Others	•	•		•		
Scientific Time Sharing Corp.		•	10, 14.9, 30, Others	•	•		•		
Service Bureau Company		•	10, 15, 30, 120, 250, 600	•	•		•		
United Computing Systems		•	10, 30	•	•		•		
University Computing Co.		•	30, Others	•	•		•		
Warner Computer Systems, Inc.		•	10, 30, 120	•	•		•	Chicago, IL New York, NY	
Cleveland, OH		ADP Network Services, Inc.	•	10, 30, 120	•	•		•	Dayton, OH
		Avco Computer Services	•	10, 15, 30, 120, Others	•	•		•	
		Boeing Computer Services Co.	•	10, 30, 120, Others	•	•	4	•	Philadelphia, PA Chicago, IL New York, NY New York, NY
		Bowne Information Systems, Inc.	•	15, 30	•	•		•	
	CallData Systems, Inc.	•	10, 15, 30	•	•		•		
	Citishare	•	30, 120	•	•		•		
	Computer Usage Company	•	10, 15, 30, Others	•	•		•		
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•		
	Data Resources, Inc.	•	30	•	•		•	Pittsburgh, PA	
									(Continued...)

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# Toll-Free Reference Chart for Remote Computing Services

**XX.078**

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
<b>Columbus, OH</b>	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			Fairfield, NJ Chicago, IL
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	Chicago, IL
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				
	Interactive Data Corporation	•	30, 120, Others	•	•		•	Chicago, IL
	Interactive Market Systems, Inc.	•	10, 30	•				
	Martin Marietta Data Systems	•	30, 120, 240, 480	•	•	4	•	Chicago, IL
	McDonnell Douglas	•	10, 30, 120, Others	•	•	11	•	
	National CSS, Inc.	•	10, 13.4, Others	•			•	Chicago, IL
	On-Line Systems, Inc.	•	10, 14.8, 15, 30, 120	•	•	4	•	
	Rapidata, Inc.	•	10, 15, 30, 60, Others	•				Chicago, IL Detroit, MI
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•	Troy, MI New York, NY
	United Computing Systems	•	10, 30, Others	•	•		•	
	University Computing Co.	•	30, Others	•				Troy, MI New York, NY
	Warner Computer Systems, Inc.	•	10, 30, 120	•				
	ADP Network Services, Inc.	•	10, 30	•	•			Dayton, OH Dearborn, MI Philadelphia, PA Chicago, IL New York, NY New York, NY Pittsburgh, PA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	30, 200, 240, 480	•				Fairfield, NJ Chicago, IL Cleveland, OH Cleveland, OH Chicago, IL Detroit, MI
	Bowen Information Systems, Inc.	•	15, 30	•				
<b>Dallas, Ft. Worth, TX</b>	CallData Systems, Inc.	•	10, 15, 30	•				Fairfield, NJ Chicago, IL Cleveland, OH Cleveland, OH Chicago, IL Detroit, MI
	Citishare	•	30, 120	•				
	Computer Usage Company	•	10, 15, 30, Others	•				Troy, MI New York, NY
	Data Resources, Inc.	•	30	•				
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			Wilmington, MA Houston, TX New York, NY Los Angeles, CA Houston, TX
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	Los Angeles, CA Chicago, IL Chicago, IL
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				
	National CSS, Inc.	•	30	•				Los Angeles, CA Chicago, IL Chicago, IL
	On-Line Systems, Inc.	•	10, 14.8, 15, 30	•				
	Rapidata, Inc.	•	10, 15, 30, 60, Others	•				Wilmington, MA Houston, TX New York, NY Los Angeles, CA Houston, TX
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•	Los Angeles, CA Chicago, IL Chicago, IL
	United Computing Systems	•	10, 30, 120, Others	•	•		•	
	University Computing Co.	•	30, Others	•				Los Angeles, CA Chicago, IL Chicago, IL
	Warner Computer Systems, Inc.	•	10, 30, 120	•				
	ADP Network Services, Inc.	•	10, 30, 120	•	•			Wilmington, MA Houston, TX New York, NY Los Angeles, CA Houston, TX
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	10, 30, 120, Others	•	•	10	•	Los Angeles, CA Chicago, IL Chicago, IL
	Bowen Information Systems, Inc.	•	15, 30, 120	•	•	4		
	CallData Systems, Inc.	•	10, 15, 30, 120	•	•			Los Angeles, CA Chicago, IL Chicago, IL
	Citishare	•	30, 120	•				
	Computer Usage Company	•	10, 15, 30, Others	•				Los Angeles, CA Chicago, IL Chicago, IL
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•	
	Data Resources, Inc.	•	30	•				Los Angeles, CA Chicago, IL Chicago, IL
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			Los Angeles, CA Chicago, IL Chicago, IL
	Informatics Inc.	•	10, 15, 30, Others	•			•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Los Angeles, CA Chicago, IL Chicago, IL
	Interactive Market Systems, Inc.	•	10, 30	•				
	I.P. Sharp Associates, Inc.	•	15, 30, 120	•	•	5	•	Los Angeles, CA Chicago, IL Chicago, IL
	McDonnell Douglas	•	10, 30, 120, Others	•	•	9	•	
	National CSS, Inc.	•	10, 13.4, Others	•			•	Los Angeles, CA Chicago, IL Chicago, IL
		•		•				

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**Toll-Free Reference Chart  
for  
Remote Computing Services**

XX.079

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
Dayton, OH	On-Line Systems, Inc.	•	10, 14.8, 15, 30, 120	•	•	6	•	Atlanta, GA
	Rapidata, Inc.	•	10, 15, 30, 60, Others	•	•	2	•	
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•	•	•	•	
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•	4	•	
	Sun Information Services Co.	•	10, 15, 30, 120, Others	•	•	4	•	
	Time Sharing Resources	•	30, Others	•	•	4	•	
	United Computing Systems	•	10, 30, 120, Others	•	•	500+	•	New York, NY
	University Computing Co.	•	30, 120, Others	•	•	•	•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•	•	•	•	
	ADP Network Services, Inc.	•	10, 30	•	•	•	•	
	Avco Computer Services	•	10, 15, 30, 120, Others	•	•	2	•	
	Boeing Computer Services Co.	•	200, 240, 480	•	•	•	•	Dearborn, MI
	Calldata Systems, Inc.	•	10, 15, 30	•	•	•	•	
	Citishare	•	30, 120	•	•	•	•	Chicago, IL
	Computer Usage Company	•	10, 15, 30, Others	•	•	•	•	
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•	•	•	New York, NY
	Data Resources, Inc.	•	30	•	•	•	•	
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•	•	•	Cincinnati, OH
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•	•	•	
	Informatics Inc.	•	10, 15, 30	•	•	•	•	Pittsburgh, PA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•	•	•	•	
	National CSS, Inc.	•	30	•	•	•	•	Cincinnati, OH
	On-Line Systems, Inc.	•	10, 14.8, 15, 30	•	•	•	•	
	Rapidata, Inc.	•	10, 15, 30, 60, Others	•	•	•	•	Fairfield, NJ
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•	•	•	•	
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•	•	•	Chicago, IL
	University Computing Co.	•	30, Others	•	•	•	•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•	•	•	•	Detroit, MI
Denver, Boulder, CO	ADP Network Services, Inc.	•	10, 30, 120	•	•	•	•	Troy, MI
	Avco Computer Services	•	10, 15, 30, 120, Others	•	•	•	•	
	Boeing Computer Services Co.	•	10, 30, 120, Others	•	•	7	•	New York, NY
	Bowne Information Systems, Inc.	•	15, 30	•	•	•	•	
	Calldata Systems, Inc.	•	10, 15, 30, 120	•	•	•	•	Los Angeles, CA
	Citishare	•	30, 120	•	•	•	•	
	Computer Sharing Services, Inc.	•	10, 30, 120, Others	•	•	•	•	Chicago, IL
	Computer Usage Company	•	10, 15, 30, Others	•	•	•	•	
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•	•	•	San Francisco, CA
	Data Resources, Inc.	•	30	•	•	•	•	
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•	•	•	Chicago, IL
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•	•	•	
	Informatics Inc.	•	10, 15, 30	•	•	•	•	Los Angeles, CA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•	•	•	•	
	McDonnell Douglas	•	10, 30, 120, Others	•	•	100+	•	Chicago, IL
	National CSS, Inc.	•	10, 13.4, Others	•	•	•	•	
	On-Line Systems, Inc.	•	30	•	•	•	•	Los Angeles, CA
	Rapidata, Inc.	•	10, 15, 30, 60, Others	•	•	•	•	
	Scientific Time Sharing Corp.	•	10, 14.9, 30, 120, Others	•	•	3	•	San Francisco, CA
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•	•	•	
	United Computing Systems	•	10, 30, 120, Others	•	•	•	•	Tulsa, OK
	University Computing Co.	•	30, 120, Others	•	•	•	•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•	•	•	•	New York, NY
Detroit, MI	ADP Network Services, Inc.	•	10, 30, 120	•	•	•	•	

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**Toll-Free Reference Chart  
for  
Remote Computing Services**

XX.080

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
Edmonton, Alberta	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	30, 120, Others	•	•	8		Chicago, IL
	Bowne Information Systems, Inc.	•	15, 30					Chicago, IL
	CallData Systems, Inc.	•	10, 15, 30, 120					New York, NY
	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•	Chicago, IL
	Data Resources, Inc.	•	30, 120	•				
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	Fairfield, NJ
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL
	Interactive Data Corporation	•	10, 15, 30, Others	•	•		•	
	Interactive Market Systems, Inc.	•	10, 30	•				Chicago, IL
	McDonnell Douglas	•	10, 30, 120, Others	•	•	12	•	
	National CSS, Inc.	•	10, 13.4, Others				•	
	On-Line Systems, Inc.	•	10, 14.8, 30, 15, 120		•	3		
	Rapidata, Inc.	•	10, 15, 30, 60, Others	•	•	5	•	
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•	•	2		
	Service Bureau Company	•	10, 15, 30, 250, 600	•	•		•	
	University Computing Co.	•	30, 120, Others	•	•	4	•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
Edmonton, Alberta	ADP Network Services, Inc.	•	10, 30					Ann Arbor, MI
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	30	•	•	3	•	
	Citishare	•	30, 120					New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			
	Data Resources, Inc.	•	30	•				Toronto, ONT
	General Electric, Canadian	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30					Toronto, ONT
	Informatics Inc.	•						
	INSCO Systems	•	10, 30					Chicago, IL
	Interactive Market Systems, Inc.	•	10, 30	•				Toronto, ONT
	I.P. Sharp Associates Ltd.	•	15, 30, 120		•	6		
	OLS Comp. Serv. Can. Ltd.	•	10					Toronto, ONT
	Rapidata, Inc.	•	10, 15, 30					San Francisco, CA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Denver, CO
	United Computing Systems	•	10, 30		•			
	University Computing Co.	•	30, Others	•				Bellevue, WA
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
Flint, MI	ADP Network Services, Inc.	•	10, 30					Wilmington, MA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Dearborn, MI
	Boeing Computer Services Co.	•	200, 240, 480	•				Detroit, MI
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Southfield, MI
	Honeywell, DATANETWORK	•	10, 30, 120, Others					Fairfield, NJ
	Informatics Inc.	•	10, 15, 30, 120	•			•	Chicago, IL
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Detroit, MI
	Rapidata, Inc.	•	10, 15, 30, 60, 120					Detroit, MI
	Service Bureau Company	•	250, 600	•				Troy, MI
	University Computing Co.	•	30, Others	•				New York, NY
	Warner Computer Systems, Inc.	•	10, 30, 120	•				

(Continued...)



# Toll-Free Reference Chart for Remote Computing Services

**XX.081**

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
<b>Fort Lauderdale, Hollywood, FL</b>	ADP Network Services, Inc.	•	10, 30					Atlanta, GA Shalimar, FL Atlanta, GA Atlanta, GA New York, NY Miami, FL Houston, TX Miami, FL Miami, FL McLean, VA Neptune, NJ Atlanta, GA  Chapel Hill, NC Jacksonville, FL  New York, NY
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	15, 30, Others	•				
	CallData Systems, Inc.	•	10, 15, 30					
	Citishare	•	30, 120					
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•				
	Data Resources, Inc.	•	30	•				
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				
	Honeywell DATANETWORK	•	10, 30, 120, Others					
	Informatics Inc.	•	10, 15, 30	•			•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				
	On-Line Systems, Inc.	•	10, 30					
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•	•	6	•	
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				
	Service Bureau Company	•	10, 30, 250, 600	•				
	Time Sharing Resources	•	30, Others	•	•	5	•	
	University Computing Co.	•	30, Others	•	•	3	•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•				
<b>Gary, Hammond, East Chicago, IN</b>	Boeing Computer Services Co.	•	200, 240, 480	•				Chicago, IL Chicago, IL Chicago, IL Schiller Park, IL Fairfield, NJ Chicago, IL  Chicago, IL Indianapolis, IN Chicago, IL New York, NY
	CallData Systems, Inc.	•	10, 15, 30					
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				
	Honeywell DATANETWORK	•	10, 30, 120, Others					
	Informatics Inc.	•	10, 15, 30, 120	•			•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				
	National CSS, Inc.	•	10, 13.4, Others					
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•				
	Service Bureau Company	•	250, 600	•				
	University Computing Co.	•	30, Others	•				
	Warner Computer Systems, Inc.	•	10, 30, 120	•				
<b>Grand Rapids, MI</b>	ADP Network Services, Inc.	•	10, 30					Kalamazoo, MI Wilmington, MA Dearborn, MI New York, NY Chicago, IL  Fairfield, NJ Neptune, NJ Detroit, MI Detroit, MI Chicago, IL Detroit, MI Detroit, MI Troy, MI New York, NY
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	200, 240, 480	•				
	Citishare	•	30, 120					
	Data Resources, Inc.	•	10, 30	•				
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others		•			
	Informatics Inc.	•	10, 15, 30, 120	•			•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				
	National CSS, Inc.	•	30					
	On-Line Systems, Inc.	•	10, 30					
	Rapidata, Inc.	•	10, 15, 30, 60, 120					
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				
	Service Bureau Company	•	250, 600	•				
	University Computing Co.	•	30, Others	•				
	Warner Computer Systems, Inc.	•	10, 30, 120	•				
<b>Greensboro, Winston, Salem, High Point, NC</b>	ADP Network Services, Inc.	•	10, 30					Wilmington, MA Atlanta, GA Atlanta, GA New York, NY
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	200, 240, 480	•				
	CallData Systems, Inc.	•	10, 15, 30					
	Citishare	•	30, 120					
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			

(Continued...)



## Toll-Free Reference Chart for Remote Computing Services

XX-082

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll-Free "Hot Line" •	Yes •	No. of Local Personnel	Remote-Batch Terminal Available •	
<b>Greenville, Spartanburg, SC</b>	Honeywell DATANETWORK Informatics Inc.	•	10, 30, 120, Others	•	•		•	McLean, VA
	INSCO Systems	•	10, 15, 30	•				Neptune, NJ
	On-Line Systems, Inc.	•	10, 14.7, 15, 30, 120	•				Pittsburgh, PA
	Rapidata, Inc.	•	10, 30					Washington, D.C.
	Scientific Time Sharing Corp.	•	10, 15, 30, 60, 120	•				Chapel Hill, NC
	Service Bureau Company	•	10, 14.9, 30, Others	•	•		•	Falls Church, VA
	University Computing Co.	•	10, 15, 30, 250, 600	•				New York, NY
	Warner Computer Systems, Inc.	•	30, Others	•				
<b>Hamilton, ONT</b>	Boeing Computer Services Co.	•	10, 30, 120	•				Atlanta, GA
	Citishare	•	200, 240, 480	•				New York, NY
	Data Resources, Inc.	•	30, 120	•				Washington, D.C.
	General Electric Info. Serv. Co.	•	10, 30	•				Charlotte, NC
	Honeywell DATANETWORK Informatics Inc.	•	10, 30, 120, Others	•	•			
	INSCO Systems	•	10, 30, 120, Others	•			•	McLean, VA
	On-Line Systems, Inc.	•	10, 15, 30	•				Neptune, NJ
	Rapidata, Inc.	•	10, 14.7, 15, 30, 120	•				Atlanta, GA
<b>Hartford, CT</b>	Scientific Time Sharing Corp.	•	10, 30	•				Atlanta, GA
	Service Bureau Company	•	10, 14.9, 30, Others	•				Chapel Hill, NC
	University Computing Co.	•	10, 15, 30, 250, 600	•				Atlanta, GA
	Warner Computer Systems, Inc.	•	30, Others	•				St. Petersburg, FL
		•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30	•				Ann Arbor, MI
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	General Electric, Canadian	•	10, 30, 120, Others	•	•			
<b>Hartford, CT</b>	Honeywell DATANETWORK INSCO Systems	•	10, 30, 120, Others	•				Willowdale, ONT
	Scientific Time Sharing Corp.	•	10, 30	•				Chicago, IL
	Warner Computer Systems, Inc.	•	30	•				Detroit, MI
		•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	30, Others	•				Wellesley, MA
	Bowne Information Systems, Inc.	•	15, 30	•				New York, NY
<b>Hartford, CT</b>	CallData Systems, Inc.	•	10, 15, 30	•				Norwalk, CT
	Citishare	•	30, 120	•				New York, NY
	Computer Usage Company	•	10, 15, 30, Others	•				New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•				White Plains, NY
	Data Resources, Inc.	•	30	•				New York, NY
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK Informatics Inc.	•	10, 30, 120, Others	•	•			
	INSCO Systems	•	10, 15, 30	•			•	New York, NY
<b>Hartford, CT</b>	Interactive Data Corporation	•	10, 14.7, 15, 30, 120	•			•	New York, NY
	McDonnell Douglas	•	15, 30, Others	•	•		•	
	National CSS, Inc.	•	10, 30, 120, Others	•	•	12	•	
	On-Line Systems, Inc.	•	10, 13.4, 30	•			•	
	Rapidata, Inc.	•	10, 14.8, 15, 30	•				Boston, MA
	Scientific Time Sharing Corp.	•	10, 15, 30, 60, 120	•	•	5	•	
	Service Bureau Company	•	10, 14.9, 30, Others	•	•	3	•	
	Sun Information Services Co.	•	10, 15, 30, 250, 600	•	•		•	
<b>Hartford, CT</b>	Time Sharing Resources	•	10, 15, 30, 120, Others	•	•	2	•	
		•	30, Others	•	•	4	•	

(Continued...)

(Continued...)



# Toll-Free Reference Chart for Remote Computing Services

**XX.083**

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
<b>Honolulu, HI</b>	United Computing Systems	•	10, 30, 120, Others	•	•		•	Farmington, CT
	University Computing Co.	•	30, 120, Others	•				
	Warner Computer Systems, Inc.	•	10, 30, 120	•	•	7	•	
	ADP Network Services, Inc.	•	10, 30, 120					Los Angeles, CA Wilmington, MA Seattle, WA Los Angeles, CA New York, NY
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	30	•				
	CallData Systems, Inc.	•	10, 15, 30, 120					San Francisco, CA San Francisco, CA
	Citishare	•	30, 120					
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			
	Data Resources, Inc.	•	30	•				San Francisco, CA Chicago, IL Los Angeles, CA Los Angeles, CA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				
	Honeywell DATANETWORK	•	10, 30, 120, Others		•			
	Informatics Inc.	•	10, 15, 30	•			•	New York, NY
	INSCO Systems	•	10, 30					
	On-Line Systems, Inc.	•	10, 30					
<b>Houston, TX</b>	Rapidata, Inc.	•	10, 15, 30					Wilmington, MA Dallas, TX
	Scientific Time Sharing Corp.	•	10, 14.9, 30	•	•	1		
	Service Bureau Company	•	15, 30, 250, 600	•	•		•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•				Los Angeles, CA Chicago, IL
	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	30, 120, Others	•				Dallas, TX Atlanta, GA
	Bowne Information Systems, Inc.	•	15, 30		•	7		
	CallData Systems, Inc.	•	10, 15, 30, 120	•	•	4		
	Citishare	•	30, 120					Los Angeles, CA Chicago, IL
	Computer Usage Company	•	10, 15, 30, Others					
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•	
	Data Resources, Inc.	•	30, 120	•	•	4		Dallas, TX Atlanta, GA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
<b>Indianapolis, IN</b>	Informatics Inc.	•	10, 15, 30	•			•	New York, NY
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				
	Interactive Data Corporation	•	30, 120, Others	•	•		•	
	I.P. Sharp Associates, Inc.	•	15, 30, 120		•	7		Wilmington, MA Chicago, IL Chicago, IL Chicago, IL New York, NY
	Martin Marietta Data Systems	•	30, 120, 240, 480	•	•	4	•	
	McDonnell Douglas	•	10, 30, 120, Others	•	•	34	•	
	National CSS, Inc.	•	10, 13.4, Others					Dallas, TX Atlanta, GA
	On-Line Systems, Inc.	•	10, 30					
	Rapidata, Inc.	•	10, 15, 30, 60, 120					
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•	•	4		New York, NY
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•	
	Time Sharing Resources	•	30, Others	•	•	4	•	
	United Computing Systems	•	10, 30, 120, Others	•	•		•	New York, NY
	University Computing Co.	•	30, 120, Others	•	•	16	•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•				
<b>Indianapolis, IN</b>	ADP Network Services, Inc.	•	10, 30	•	•		•	Wilmington, MA Chicago, IL Chicago, IL Chicago, IL New York, NY
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	200, 240, 480	•				
	Bowne Information Systems, Inc.	•	15, 30					
	CallData Systems, Inc.	•	10, 15, 30					
	Citishare	•	30, 120					

(Continued...)



# Toll-Free Reference Chart for Remote Computing Services

**XX.084**

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
<b>Jacksonville, FL</b>	Computer Usage Company	•	10, 15, 30, Others	•				New York, NY
	Data Resources, Inc.	•	30, 120	•				Chicago, IL
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	Fairfield, NJ
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL
	McDonnell Douglas	•	10, 30, 120, Others	•	•	6	•	
	National CSS, Inc.	•	10, 13.4, 30	•				
	On-Line Systems, Inc.	•	10, 30	•				Chicago, IL
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•				Chicago, IL
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Chicago, IL
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•	
	University Computing Co.	•	30, 120, Others	•				Chicago, IL
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30	•				Atlanta, GA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Shalimar, FL
	Boeing Computer Services Co.	•	30, 120, Others	•				Atlanta, GA
	CallData Systems, Inc.	•	10, 15, 30	•				Atlanta, GA
	Citishare	•	30, 120	•				New York, NY
	Computer Usage Company	•	10, 15, 30, Others	•				Atlanta, GA
<b>Jersey City, NJ</b>	Data Resources, Inc.	•	30	•				Houston, TX
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Tampa, FL
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	McLean, VA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Neptune, NJ
	On-Line Systems, Inc.	•	10, 30	•				Atlanta, GA
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•				Ft. Lauderdale, FL
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Chapel Hill, NC
	Service Bureau Company	•	10, 15, 30, 250, 600	•	•		•	
	Time Sharing Resources	•	30, Others	•	•	5	•	
	University Computing Co.	•	30, Others	•				St. Petersburg, FL
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Rockaway, NJ
	Boeing Computer Services Co.	•	200, 240, 480	•				Morristown, NJ
	CallData Systems, Inc.	•	10, 15, 30, 120	•				New York, NY
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				East Orange, NJ
	Honeywell DATANETWORK	•	10, 30, 120, Others	•				Chatham, NJ
	Informatics Inc.	•	10, 15, 30, 120	•			•	Fairfield, NJ
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Neptune, NJ
	National CSS, Inc.	•	120, Others	•			•	Elizabeth, NJ
<b>Kansas City, MO-KS</b>	On-Line Systems, Inc.	•	10, 30	•				Clifton, NJ
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•				Fairfield, NJ
	Service Bureau Company	•	250, 600	•				Saddlebrook, NJ
	Time Sharing Resources	•	30, Others	•	•	6	•	
	University Computing Co.	•	30, Others	•				Short Hills, NJ
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30, 120	•				St. Louis, MO
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	30, 120, Others	•				Wichita, KS
	Bowne Information Systems, Inc.	•	15, 30	•				Chicago, IL
	CallData Systems, Inc.	•	10, 15, 30	•				Dallas, TX

(Continued...)

**Toll-Free Reference Chart  
for  
Remote Computing Services**

XX.085

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
Los Angeles, Long Beach, CA	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			
	Data Resources, Inc.	•	30	•				Chicago, IL
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	McLean, VA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL
	Interactive Market Systems, Inc.	•	10, 30	•				Chicago, IL
	McDonnell Douglas	•	10, 30, 120, Others	•	•	6	•	
	National CSS, Inc.	•	10, 13.4, 30				•	
	On-Line Systems, Inc.	•	10, 30					Dallas, TX
	Rapidata, Inc.	•	10, 15, 30, 60, 120					Chicago, IL
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Chicago, IL
	Service Bureau Company	•	10, 15, 30, 250, 600	•	•		•	
	United Computing Systems	•	10, 30, 120, Others	•	•		•	
	University Computing Co.	•	30, 120, Others	•				Tulsa, OK
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	
	Avco Computer Services	•	10, 15, 30, 120, Others	•	•	3		
	Boeing Computer Services Co.	•	10, 15, 30, 120, Others	•	•	14	•	
	Bowne Information Systems, Inc.	•	15, 30, 120	•	•	6		
	CallData Systems, Inc.	•	10, 15, 30, 120	•	•	7		
	Citishare	•	30, 120					New York, NY
	Computer Sharing Services, Inc.	•	10, 30, 120, Others	•	•		•	
	Computer Usage Company	•	10, 15, 30, Others	•	•	4	•	
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•	
	Data Resources, Inc.	•	30, 120	•				San Francisco, CA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30, Others	•	•		•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL
	Interactive Data Corporation	•	10, 15, 30, 120, Others	•	•		•	
	Interactive Market Systems, Inc.	•	10, 30	•	•	1	•	
	I.P. Sharp Associates, Inc.	•	15, 30, 120	•	•	6		
	Martin Marietta Data Systems	•	30, 120, 240, 480	•	•	3	•	
	McDonnell Douglas	•	10, 30, 120, Others	•	•	000+	•	
	National CSS, Inc.	•	120, 200, Others				•	
	On-Line Systems, Inc.	•	10, 14.8, 15, 30, 120	•	•	9	•	
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•	•	13	•	
	Ross Systems, Inc.	•	30, 120	•	•	2	•	
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•	•	10		
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•	
	Time Sharing Resources	•	30, Others	•	•	4	•	
	United Computing Systems	•	10, 30	•	•		•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
Louisville, KY-IN	ADP Network Services, Inc.	•	10, 30					Cincinnati, OH
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	30, 120, Others	•				Dearborn, MI
	CallData Systems, Inc.	•	10, 15, 30					Washington, D.C.
	Citishare	•	30, 120					New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•				Cincinnati, OH
(Continued...)								





# Toll-Free Reference Chart for Remote Computing Services

**XX.086**

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
<b>Memphis, TN-AR-MS</b>	Data Resources, Inc.	•	30, 120	•				Chicago, IL
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others		•			
	Informatics Inc.	•	10, 15, 30	•			•	McLean, VA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL
	National CSS, Inc.	•						
	On-Line Systems, Inc.	•	10, 30					Atlanta, GA
	Rapidata, Inc.	•	10, 15, 30, 60, 120					Atlanta, GA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Chicago, IL
	Service Bureau Company	•	10, 15, 30, 250, 600	•			•	
	University Computing Co.	•	30, Others	•				Chicago, IL
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	200, 240, 480	•				Atlanta, GA
	CallData Systems, Inc.	•	10, 15, 30					Washington, D.C.
	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					Atlanta, GA
	Data Resources, Inc.	•	30	•				Houston, TX
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Nashville, TN
<b>Miami, FL</b>	Honeywell DATANETWORK	•	10, 30, 120, Others		•			
	Informatics Inc.	•	10, 15, 30	•			•	McLean, VA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL
	Interactive Market Systems, Inc.	•	10, 30	•				Chicago, IL
	National CSS, Inc.	•	30					
	On-Line Systems, Inc.	•	10, 30					Atlanta, GA
	Rapidata, Inc.	•	10, 15, 30, 60, 120					Atlanta, GA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Chapel Hill, NC
	Service Bureau Company	•	10, 15, 30, 250, 600	•	•		•	
	Time Sharing Resources	•	30, Others	•	•	5	•	
	University Computing Co.	•	30, 120, Others	•				Tulsa, OK
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30, 120					Atlanta, GA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Shalimar, FL
	Boeing Computer Services Co.	•	30, Others	•				Atlanta, GA
	Bowne Information Systems, Inc.	•	15, 30					Atlanta, GA
	CallData Systems, Inc.	•	10, 15, 30, 120					Chicago, IL
	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					Atlanta, GA
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•	
<b>Miami, FL</b>	Data Resources, Inc.	•	30, 120	•				Houston, TX
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	McLean, VA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Neptune, NJ
	I.P. Sharp Associates, Inc.	•	15, 30, 120		•	1		
	McDonnell Douglas	•	10, 30, 120, Others	•	•	3	•	
	On-Line Systems, Inc.	•	10, 30					
	Rapidata, Inc.	•	10, 15, 30, 60, 120					Atlanta, GA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Ft. Lauderdale, FL
	Service Bureau Company	•	10, 15, 30, 250, 600	•	•		•	Chapel Hill, NC
	Time Sharing Resources	•	30, Others	•	•	5	•	
	University Computing Co.	•	30, 120, Others	•				St. Petersburg, FL
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
								(Continued...)

**Toll-Free Reference Chart  
for  
Remote Computing Services**

XX.087

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
<b>Milwaukee, WI</b>	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	Wilmington, MA Chicago, IL Chicago, IL
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	200, 240, 480	•				
	Bowne Information Systems, Inc.	•	15, 30					Chicago, IL
	CallData Systems, Inc.	•	10, 15, 30					Chicago, IL
	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•	Chicago, IL
	Data Resources, Inc.	•	30	•				
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			Fairfield, NJ Chicago, IL
	Informatics Inc.	•	10, 15, 30	•			•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				
	Interactive Data Corporation	•	30, Others	•	•		•	Chicago, IL Chicago, IL Chicago, IL
	McDonnell Douglas	•	10, 30, 120, Others	•	•	8	•	
	National CSS, Inc.	•	30, 120, Others				•	
	On-Line Systems, Inc.	•	10, 30					Chicago, IL Chicago, IL Chicago, IL
	Rapidata, Inc.	•	10, 15, 30, 60, 120					
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				
	Service Bureau Company	•	10, 15, 30, 120, 600	•	•		•	Chicago, IL New York, NY
	United Computing Systems	•	10, 30	•	•		•	
	University Computing Co.	•	30, Others	•				
	Warner Computer Systems, Inc.	•	10, 30, 120	•				
<b>Minneapolis, St. Paul, MN-WI</b>	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	Wilmington, MA Chicago, IL Chicago, IL
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	30, Others	•				
	Bowne Information Systems, Inc.	•	15, 30					Chicago, IL
	CallData Systems, Inc.	•	10, 15, 30, 120					Chicago, IL
	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					New York, NY
	Data Resources, Inc.	•	30	•				Chicago, IL
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			Fairfield, NJ Chicago, IL
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•				
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL Chicago, IL Chicago, IL
	Interactive Data Corporation	•	10, 15, 30, Others	•	•		•	
	McDonnell Douglas	•	10, 30, 120, Others	•	•	8	•	
	National CSS, Inc.	•	10, 13.4, 30					Chicago, IL Chicago, IL Chicago, IL
	On-Line Systems, Inc.	•	10, 30					
	Rapidata, Inc.	•	10, 15, 30, 60, 120					
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Chicago, IL New York, NY
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•	
	United Computing Systems	•	10, 30	•	•		•	
	University Computing Co.	•	30, 120, Others	•				Chicago, IL New York, NY
	Warner Computer Systems, Inc.	•	10, 30, 120	•				
<b>Montreal, QUE</b>	ADP Network Services, Inc.	•	10, 30					Ann Arbor, MI Wilmington, MA Boston, MA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	CallData Systems, Inc.	•	10, 15, 30					
	Citishare	•	30, 120					New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			Toronto, ONT
	Data Resources, Inc.	•	10, 15, 30	•	•			
	General Electric, Canadian	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30	•	•			

(Continued...)

**Toll-Free Reference Chart  
for  
Remote Computing Services**

XX.088

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
Nashville, Davidson, TN	INSCO Systems	•	10, 30					Chicago, IL
	Interactive Market Systems, Inc.	•	10, 30	•				Toronto, ONT
	I.P. Sharp Associates, Inc.	•	15, 30, 120		•	5		
	National CSS, Inc.	•	30					Stamford, CT
	OLS Comp. Serv. Can. Ltd.	•	30, 14.8					Toronto, ONT
	Rapidata, Inc.	•	10, 15, 30					Boston, MA
	Scientific Time Sharing Corp.	•	14.9, 30	•				Boston, MA
	Service Bureau Company	•	10, 15, 30, 250, 600	•	•		•	
	University Computing Co.	•	30, Others	•				New York, NY
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30					Memphis, TN
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	30, 120, Others	•				Atlanta, GA
	Calldata Systems, Inc.	•	10, 15, 30					Washington, D.C.
	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					Atlanta, GA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others		•			
	Informatics Inc.	•	10, 15, 30	•			•	McLean, VA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•				Atlanta, GA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Chapel Hill, NC
	Service Bureau Company	•	10, 15, 30, 250, 600	•				Washington, D.C.
	Time Sharing Resources	•	30, Others	•	•	5	•	
	University Computing Co.	•	30, Others	•				Chicago, IL
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
Nassau, Suffolk, NY	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	30, 33, Others	•				New York, NY
	Bowne Information Systems, Inc.	•	15, 30					New York, NY
	Calldata Systems, Inc.	•	10, 15, 30, 120	•	•	11		
	Citishare	•	30, 120					New York, NY
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Huntington, NY
	Honeywell DATANETWORK	•	10, 30, 120, Others					Albany, NY
	Informatics Inc.	•	10, 15, 30, Others	•			•	New York, NY
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				New York, NY
	National CSS, Inc.	•						New York, NY
	On-Line Systems, Inc.	•	10, 14.8, 15, 30					New York, NY
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•	•	5	•	
	Service Bureau Company	•	10, 15, 30, 250, 600	•				New York, NY
	Time Sharing Resources	•	30, Others	•	•	20	•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
New Brunswick, Perth Amboy, Sayreville, NJ	Avco Computer Services	•	10, 15, 30, 120, Others	•				Rockaway, NJ
	Boeing Computer Services Co.	•	10, Others	•				Morristown, NJ
	Computer Usage Company	•	10, 15, 30, Others					New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•				Hackensack, NJ
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				East Orange, NJ
	Honeywell DATANETWORK	•	10, 30, 120, Others	•				Westfield, NJ
	Informatics Inc.	•	10, 15, 30, 120	•			•	Fairfield, NJ
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Neptune, NJ
	Interactive Market Systems, Inc.	•	10, 30	•				New York, NY

(Continued...)



# GEOGRAPHIC DIRECTORY

## Toll-Free Reference Chart for Remote Computing Services

XX.089

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
New Orleans, LA	National CSS, Inc. On-Line Systems, Inc. Rapidata, Inc. University Computing Co. Warner Computer Systems, Inc.	•	120, Others	•	•	4	•	Elizabeth, NJ Clifton, NJ Fairfield, NJ  New York, NY
	ADP Network Services, Inc. Avco Computer Services Boeing Computer Services Co. Bowne Information Systems, Inc. CallData Systems, Inc. Citishare Computer Usage Company CSC/INFONET Data Resources, Inc. General Electric Info. Serv. Co. Honeywell DATANETWORK Informatics Inc. INSCO Systems McDonnell Douglas National CSS, Inc. On-Line Systems, Inc. Rapidata, Inc. Scientific Time Sharing Corp. Service Bureau Company University Computing Co. Warner Computer Systems, Inc.	•	10, 30 10, 15, 30, 120, Others 30, 200, 240, 480 15, 30 10, 15, 30, 120 30, 120 10, 15, 30, Others 10, 14.8, 30, 120, 480 30 10, 30, 120, Others 10, 30, 120, Others 10, 15, 30 10, 14.7, 15, 30, 120 10, 30, 120, Others 30 10, 30 10, 15, 30, 60, 120 10, 14.9, 30, Others 10, 15, 30, 250, 600 30, 120, Others 10, 30, 120	•	•	3	•	Houston, TX Wilmington, MA Atlanta, GA Houston, TX Houston, TX New York, NY Atlanta, GA Houston, TX Houston, TX  McLean, VA Chicago, IL  Houston, TX Dallas, TX Atlanta, GA Houston, TX Houston, TX  New York, NY
New York, NY	ADP Network Services, Inc. Avco Computer Services Boeing Computer Services Co. Bowne Information Systems, Inc. CallData Systems, Inc. Citishare Computer Sharing Services, Inc. Computer Usage Company CSC/INFONET Data Resources, Inc. General Electric Info. Serv. Co. Honeywell DATANETWORK Informatics Inc. INSCO Systems Interactive Data Corporation Interactive Market Systems, Inc. I.P. Sharp Associates, Inc. Martin Marietta Data Systems McDonnell Douglas National CSS, Inc. On-Line Systems, Inc. Rapidata, Inc. Scientific Time Sharing Corp. Service Bureau Company Sun Information Services Co. Time Sharing Resources United Computing Systems	•	10, 30, 120 10, 15, 30, 120, Others 10, 15, 30, 120, Others 15, 30, 120 10, 15, 30, 120 30, 120 10, 30, 120, Others 10, 15, 30, Others 10, 14.8, 30, 120, 480 30, 120 10, 30, 120, Others 10, 30, 120, Others 10, 15, 30 10, 14.7, 15, 30, 120 10, 15, 30, 120, Others 10, 30, 120 15, 30, 120 30, 120, 240, 480 10, 30, 120, Others 120, 480, Others 10, 14.8, 15, 30, 120 10, 15, 30, 60, 120 10, 14.9, 30, 120, Others 10, 15, 30, 120, 250, 600 10, 15, 30, 120, Others 30, Others 10, 30, 120, Others	•	•	20 18 15 50 4 26 45 7 4 45 9 44 9 4 25	•	(Continued...)



## Toll-Free Reference Chart for Remote Computing Services

XX.090

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll-Free "Hot Line" •	Yes •	No. of Local Personnel	Remote-Batch Terminal Available •	
Newark, NJ	University Computing Co.	•	30, 120, Others	•	•	15	•	
	Warner Computer Systems, Inc.	•	10, 30, 120, 480	•	•	35	•	
	ADP Network Services, Inc.	•	10, 30, 120					Parsippany, NJ
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Rockaway, NJ
	Boeing Computer Services Co.	•	200, 240, 480	•				Morristown, NJ
	Bowne Information Systems, Inc.	•	15, 30					New York, NY
	Calldata Systems, Inc.	•	10, 15, 30, 120					New York, NY
	Citishare	•	30, 120					New York, NY
	Computer Sharing Services, Inc.	•	10, 30, 120, Others	•	•		•	
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•				Hackensack, NJ
	Data Resources, Inc.	•	30	•				New York, NY
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				East Orange, NJ
	Honeywell DATANETWORK	•	10, 30, 120, Others					Westfield, NJ
	Informatics Inc.	•	10, 15, 30	•	•		•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Neptune, NJ
	Interactive Market Systems, Inc.	•	10, 30	•				New York, NY
	McDonnell Douglas	•	10, 30, 120, Others	•	•	30	•	
	National CSS, Inc.	•	120, Others				•	Elizabeth, NJ
	On-Line Systems, Inc.	•	10, 14.8, 15, 30					Clifton, NJ
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•		18	•	
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				New York, NY
	Service Bureau Company	•	250, 600	•				Saddlebrook, NJ
Norfolk, VA Beach, Portsmouth, VA-NC	Time Sharing Resources	•	30, Others	•	•	6	•	
	United Computing Systems	•	10, 30, 120, Others		•		•	
	University Computing Co.	•	30, 120, Others	•				North Brunswick, NJ
	Warner Computer Systems, Inc.	•	10, 30, 120	•	•	17	•	
	ADP Network Services, Inc.	•	10, 30	•	•			
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	30, 120, Others	•				Vienna, VA
	Calldata Systems, Inc.	•	10, 15, 30					Washington, D.C.
	Citishare	•	30, 120					New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			
	Data Resources, Inc.	•	30	•				Washington, D.C.
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Richmond, VA
	Honeywell DATANETWORK	•	10, 30, 120, Others		•			
	Informatics Inc.	•	10, 15, 30	•			•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				McLean, VA
	National CSS, Inc.	•	10, 13.4, 30					Neptune, NJ
	On-Line Systems, Inc.	•	10, 14.8, 15, 30					Washington, D.C.
	Rapidata, Inc.	•	10, 15, 30, 60, 120					Washington, D.C.
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Washington, D.C.
	Service Bureau Company	•	15, 30, 250, 600	•				Chapel Hill, NC
	University Computing Co.	•	30, Others	•				Washington, D.C.
Northeast, PA	Warner Computer Systems, Inc.	•	10, 30, 120	•				Falls Church, VA
								New York, NY
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Rockaway, NJ
	Boeing Computer Services Co.	•	200, 240, 480	•				Philadelphia, PA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Pittsburgh, PA
	Honeywell DATANETWORK	•	10, 30, 120, Others					Wilkes-Barre, PA
	Informatics Inc.	•	10, 15, 30, 120	•			•	Fairfield, NJ
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Neptune, NJ
	On-Line Systems, Inc.	•	10, 14.8, 15, 30					Buffalo, NY

(Continued...)



# Toll-Free Reference Chart for Remote Computing Services

XX.091

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
Oklahoma City, OK	Pentamation Ent., Inc. Scientific Time Sharing Corp. Service Bureau Company University Computing Co. Warner Computer Systems, Inc.	• • • • •	10, 13.4, 15, 30 10, 14.9, 30, Others 10, 15, 30, 250, 600 30, Others 10, 30, 120	• • • • •				Bethlehem, PA White Plains, NY Pittsburgh, PA Philadelphia, PA New York, NY
	ADP Network Services, Inc. Avco Computer Services Boeing Computer Services Co. CallData Systems, Inc. Citishare Computer Usage Company Data Resources, Inc. General Electric Info. Serv. Co. Honeywell DATANETWORK Informatics Inc. INSCO Systems National CSS, Inc. On-Line Systems, Inc. Rapidata, Inc. Scientific Time Sharing Corp. Service Bureau Company United Computing Systems University Computing Co. Warner Computer Systems, Inc.	• • • • • • • • • • • • • • • • • • • •	10, 30 10, 15, 30, 120, Others 200, 240, 480 10, 15, 30, 120 30, 120 10, 15, 30, Others 30 10, 30, 120, Others 10, 30, 120, Others 10, 15, 30 10, 14.7, 15, 30, 120 30 10, 30 10, 15, 30, 60, 120 10, 14.9, 30, Others 10, 15, 30, 250, 600 10, 30, 120, Others 30, 120, Others 10, 30, 120	• • • • • • • • • • • • • • • • • • • •				Dallas, TX Wilmington, MA Wichita, KS Dallas, TX New York, NY Atlanta, GA Houston, TX  Los Angeles, CA Chicago, IL Dallas, TX Dallas, TX Chicago, IL Dallas, TX Dallas, TX  Tulsa, OK New York, NY
Omaha, NE-IA	ADP Network Services, Inc. Avco Computer Services Boeing Computer Services Co. CallData Systems, Inc. Citishare Computer Usage Company Data Resources, Inc. General Electric Info. Serv. Co. Honeywell DATANETWORK Informatics Inc. INSCO Systems Interactive Market Systems, Inc. On-Line Systems, Inc. Rapidata, Inc. Scientific Time Sharing Corp. Service Bureau Company University Computing Co. Warner Computer Systems Inc.	• • • • • • • • • • • • • • • • • • • •	10, 30, 120 10, 15, 30, 120, Others 10, 30, 33, 120, Others 10, 15, 30 30, 120 10, 15, 30, Others 10, 30 10, 30, 120, Others 10, 30, 120, Others 10, 15, 30 10, 14.7, 15, 30, 120 10, 30 10, 30 10, 15, 30, 60, 120 10, 14.9, 30, Others 10, 15, 30, 250, 600 30, Others 10, 30, 120	• • • • • • • • • • • • • • • • • • • •		2		St. Louis, MO Wilmington, MA  Chicago, IL New York, NY San Francisco, CA Houston, TX  San Francisco, CA Chicago, IL Chicago, IL Chicago, IL Chicago, IL Chicago, IL  Tulsa, OK New York, NY
Orlando, FL	ADP Network Services, Inc. Avco Computer Services Boeing Computer Services Co. CallData Systems, Inc. Citishare Computer Usage Company Data Resources, Inc. General Electric Info. Serv. Co. Honeywell DATANETWORK	• • • • • • • • • •	10, 30 10, 15, 30, 120, Others 200, 240, 480 10, 15, 30 30, 120 10, 15, 30, Others 30 10, 30, 120, Others 10, 30, 120, Others 10, 30, 120, Others	• • • • • • • • • •				Atlanta, GA Shalimar, FL Atlanta, GA Atlanta, GA New York, NY Atlanta, GA Houston, TX Tampa, FL Miami, FL
								(Continued...)



**Toll-Free Reference Chart  
for  
Remote Computing Services**

XX.092

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
Ottawa, ONT	Informatics Inc.	•	10, 15, 30	•			•	McLean, VA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•			•	Neptune, NJ
	Martin Marietta Data Systems	•	30, 120, 240, 480	•	•	300	•	
	National CSS, Inc.	•	10, 13.4, 30	•				Melbourne, FL
	On-Line Systems, Inc.	•	10, 30	•				Atlanta, GA
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•				Ft. Lauderdale, FL
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Chapel Hill, NC
	Service Bureau Company	•	30, 250, 600	•				Miami, FL
	Time Sharing Resources	•	30, Others	•		5	•	Miami, FL
	United Computing Systems	•	10, 30	•	•		•	
	University Computing Co.	•	30, Others	•				St. Petersburg, FL
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
Ottawa, ONT	ADP Network Services, Inc.	•	10, 30	•				Ann Arbor, MI
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Calldata Systems, Inc.	•	10, 15, 30	•				Chicago, IL
	Citishare	•	30, 120	•	•			New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			
	Data Resources, Inc.	•	30	•				Toronto, ONT
	General Electric, Canadian	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30	•				Toronto, ONT
	INSCO Systems	•	10, 30	•				Chicago, IL
	I.P. Sharp Associates, Inc.	•	15, 30, 120	•	•	15		
	OLS Comp. Serv. Can. Ltd.	•	30	•				Toronto, ONT
	Scientific Time Sharing Corp.	•	10, 14.9, 30	•				Rochester, NY
	University Computing Co.	•	30, Others	•				New York, NY
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
Philadelphia, PA-NJ	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Rockaway, NJ
	Boeing Computer Services Co.	•	30, 120, 480, Others	•	•	14	•	
	Bowne Information Systems, Inc.	•	15, 30	•	•	7		
	Calldata Systems, Inc.	•	10, 15, 30, 120	•	•	8		
	Citishare	•	30, 120	•				New York, NY
	Computer Usage Company	•	10, 15, 30, Others	•				New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•	
	Data Resources, Inc.	•	30	•				Pittsburgh, PA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	Fairfield, NJ
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Neptune, NJ
	Interactive Data Corporation	•	10, 15, 30, Others	•	•		•	
	Interactive Market Systems, Inc.	•	10, 30	•				New York, NY
	I.P. Sharp Associates, Inc.	•	15, 30, 120	•	•	2		
	Martin Marietta Data Systems	•	30, 120, 240, 480	•	•	5	•	
	McDonnell Douglas	•	10, 30, 120, Others	•	•	7	•	
	National CSS, Inc.	•	120, Others	•				
	On-Line Systems, Inc.	•	10, 14.8, 30, 15, 120	•	•	7	•	
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•	•	7	•	
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•	•	4	•	
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•	
	Sun Information Services Co.	•	10, 15, 30, 120, Others	•	•	26	•	
	Time Sharing Resources	•	30, Others	•	•	6	•	
	United Computing Systems	•	10, 30, 120, Others	•	•		•	
	University Computing Co.	•	30, 120, Others	•	•	3	•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY

(Continued...)

# Toll-Free Reference Chart for Remote Computing Services

**XX.093**

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll-Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
Phoenix, AZ	ADP Network Services, Inc.	•	10, 30					Los Angeles, CA Wilmington, MA El Segundo, CA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	30, 200, 240, 480	•				
	Bowne Information Systems, Inc.	•	15, 30					Los Angeles, CA Los Angeles, CA New York, NY
	CallData Systems, Inc.	•	10, 15, 30					
	Citishare	•	30, 120					
	Computer Sharing Services, Inc.	•	10, 30, 120, Others	•	•		•	Los Angeles, CA
	Computer Usage Company	•	10, 15, 30, Others					
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			
	Data Resources, Inc.	•	30	•				San Francisco, CA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others		•			
	Informatics Inc.	•	10, 15, 30	•			•	Los Angeles, CA Chicago, IL
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				
	I.P. Sharp Associates, Inc.	•	15, 30, 120		•	1		
	National CSS, Inc.	•	10, 13.4, Others				•	Los Angeles, CA Los Angeles, CA Los Angeles, CA
	On-Line Systems, Inc.	•	10, 30					
	Rapidata, Inc.	•	10, 15, 30, 60, 120					
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				El Segundo, CA New York, NY
	Service Bureau Company	•	10, 15, 30, 250, 600	•	•		•	
	University Computing Co.	•	30, 120, Others	•				
	Warner Computer Systems, Inc.	•	10, 30, 120	•				
Pittsburgh, PA	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	Rockaway, NJ Cleveland, OH Philadelphia, PA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	30, 120, Others	•				
	Bowne Information Systems, Inc.	•	15, 30					Philadelphia, PA New York, NY New York, NY
	CallData Systems, Inc.	•	10, 15, 30, 120					
	Citishare	•	30, 120					
	Computer Usage Company	•	10, 15, 30, Others					Fairfield, NJ Neptune, NJ
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•	
	Data Resources, Inc.	•	10, 30, 120	•	•	9		
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			New York, NY
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				New York, NY
	Interactive Data Corporation	•	10, 15, 30, Others	•	•		•	
	Interactive Market Systems, Inc.	•	10, 30	•				
	Martin Marietta Data Systems	•	30, 120, 240, 480	•	•	3	•	Detroit, MI
	McDonnell Douglas	•	10, 30, 120, Others	•	•	7	•	
	National CSS, Inc.	•	10, 30					
	On-Line Systems, Inc.	•	10, 14.8, 15, 30, 120, Other	•	•	195	•	Piscataway, NJ Philadelphia, PA New York, NY
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•	•	7	•	
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•			•	Wilmington, MA
	Time Sharing Resources	•	30, Others	•		6	•	
	University Computing Co.	•	30, 120, Others	•				
	Warner Computer Systems, Inc.	•	10, 30, 120	•				
Portland, OR-WA	ADP Network Services, Inc.	•	10, 30	•	•		•	San Francisco, CA San Francisco, CA New York, NY
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	10, 15, 30, 120, Others	•	•	9	•	
	Bowne Information Systems, Inc.	•	15, 30					(Continued...)
	CallData Systems, Inc.	•	10, 15, 30					
	Citishare	•	30, 120					



## Toll-Free Reference Chart for Remote Computing Services

XX.094

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll-Free "Hot Line" •	Yes •	No. of Local Personnel	Remote-Batch Terminal Available •	
Providence, Warwick, Pawtucket, RI-MA	Computer Usage Company	•	10, 15, 30, Others	•	•		•	San Francisco, CA
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			
	Data Resources, Inc.	•	30	•	•			San Francisco, CA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	San Francisco, CA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL
	McDonnell Douglas	•	10, 30, 120, Others	•	•	3	•	
	National CSS, Inc.	•	10, 13.4, 30	•			•	
	On-Line Systems, Inc.	•	10, 30	•				Los Angeles, CA
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•				San Francisco, CA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				San Francisco, CA
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•	
	University Computing Co.	•	30, 120, Others	•				Bellevue, WA
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30	•				Boston, MA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	200, 240, 480	•				Wellesley, MA
	CallData Systems, Inc.	•	10, 15, 30	•				Boston, MA
	Citishare	•	30, 120	•				New York, NY
	Data Resources, Inc.	•	30	•				Boston, MA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Boston, MA
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	New York, NY
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				New York, NY
	National CSS, Inc.	•	10, 13.4, 30	•				Cambridge, MA
Richmond, VA	On-Line Systems, Inc.	•	10, 14.8, 15, 30	•				Boston, MA
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•				Hartford, CT
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Boston, MA
	Service Bureau Company	•	10, 15, 30, 250, 600	•				Boston, MA
	University Computing Co.	•	30, Others	•				Waltham, MA
	Warner Computer Systems, Inc.	•	10, 30, 120	•				Stamford, CT
	ADP Network Services, Inc.	•	10, 30	•				Norfolk, VA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	200, 240, 480	•				Vienna, VA
	CallData Systems, Inc.	•	10, 15, 30	•				Washington, D.C.
	Citishare	•	30, 120	•				New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			
	Data Resources, Inc.	•	30	•				Washington, D.C.
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	McLean, VA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Neptune, NJ
	National CSS, Inc.	•	10, 13.4, 30	•				Washington, D.C.
	On-Line Systems, Inc.	•	10, 14.8, 15, 30	•				Silver Springs, MD
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•				Washington, D.C.
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Bethesda, MD
	Service Bureau Company	•	10, 15, 30, 250, 600	•	•		•	
	University Computing Co.	•	30, Others	•				Falls Church, VA
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY

(Continued...)

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# Toll-Free Reference Chart for Remote Computing Services

**XX.095**

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
<b>Riverside, San Bernardino, Ontario, CA</b>	ADP Network Services, Inc.	•	10, 30	•	•	2		Los Angeles, CA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				El Segundo, CA
	Boeing Computer Services Co.	•	200, 240, 480	•				Los Angeles, CA
	CallData Systems, Inc.	•	10, 15, 30	•				New York, NY
	Citishare	•	30, 120	•				Los Angeles, CA
	Computer Usage Company	•	10, 15, 30, Others	•				Santa Anna, CA
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•				San Francisco, CA
	Data Resources, Inc.	•	30	•				Newport Beach, CA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Orange, CA
	Honeywell DATANETWORK	•	10, 30, 120, Others	•				Los Angeles, CA
	Informatics Inc.	•	10, 15, 30	•			•	Chicago, IL
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				San Francisco, CA
	Rapidata, Inc.	•	10, 15, 30	•				Los Angeles, CA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Los Angeles, CA
	Service Bureau Company	•	10, 15, 30, 250, 600	•				El Segundo, CA
	University Computing Co.	•	30, Others	•				New York, NY
	Warner Computer Systems, Inc.	•	10, 30, 120	•				
<b>Rochester, NY</b>	ADP Network Services, Inc.	•	10, 30	•				Buffalo, NY
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	200, 240, 480	•				New York, NY
	Bowen Information Systems, Inc.	•	15, 30	•				New York, NY
	CallData Systems, Inc.	•	10, 15, 30	•				New York, NY
	Citishare	•	30, 120	•				New York, NY
	Computer Usage Company	•	10, 15, 30, Others	•				New York, NY
	Data Resources, Inc.	•	30	•				New York, NY
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	New York, NY
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				New York, NY
	I.P. Sharp Associates, Inc.	•	15, 30, 120	•	•	20		
	National CSS, Inc.	•	10, 13.4, 30	•			•	New York, NY
	On-Line Systems, Inc.	•	10, 30, 14.8, 15, 120	•	•	9	•	
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•				Boston, MA
<b>Sacramento, CA</b>	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•	•	1		
	Service Bureau Company	•	10, 15, 30, 250, 600	•	•		•	
	Time Sharing Resources	•	30, Others	•	•	25	•	
	University Computing Co.	•	30, Others	•				New York, NY
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30	•				San Francisco, CA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Los Angeles, CA
	Boeing Computer Services Co.	•	30, 120, Others	•				San Francisco, CA
	CallData Systems, Inc.	•	10, 15, 30	•				San Francisco, CA
	Citishare	•	30, 120	•				New York, NY
	Computer Usage Company	•	10, 15, 30, Others	•				San Francisco, CA
	Data Resources, Inc.	•	30	•				San Francisco, CA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				San Francisco, CA
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	San Francisco, CA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL
	National CSS, Inc.	•	10, 13.4, 30	•				San Francisco, CA
	On-Line Systems, Inc.	•	10, 30	•				Los Angeles, CA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				San Francisco, CA
	Service Bureau Company	•	10, 15, 30, 250, 600	•				San Francisco, CA

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**Toll-Free Reference Chart  
for  
Remote Computing Services**

XX.096

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line"	Yes	No. of Local Personnel	Remote- Batch Terminal Available	
		•		•	•			
St. Louis, MO-IL	Time Sharing Resources	•	30, Others	•	•	4	•	San Francisco, CA New York, NY
	University Computing Co.	•	30, Others	•				
	Warner Computer Systems, Inc.	•	10, 30, 120	•				
	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	Wilmington, MA Chicago, IL Chicago, IL Dallas, TX New York, NY New York, NY Chicago, IL
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	30, 120, Others	•				
	Bowne Information Systems, Inc.	•	15, 30					
	CallData Systems, Inc.	•	10, 15, 30, 120					
	Citishare	•	30, 120					
	Computer Usage Company	•	10, 15, 30, Others					
	Data Resources, Inc.	•	30	•				
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others		•			
	Informatics Inc.	•	10, 15, 30	•			•	McLean, VA Chicago, IL Chicago, IL
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				
	Interactive Market Systems, Inc.	•	10, 30	•				
	McDonnell Douglas	•	10, 30, 120, Others	•	•	000+	•	
	National CSS, Inc.	•	10, 13.4, 30				•	
	On-Line Systems, Inc.	•	30					Chicago, IL Chicago, IL Chicago, IL
	Rapidata, Inc.	•	10, 15, 30, 60, 120					
Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•					
Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•		
United Computing Systems	•	10, 30, 120, Others	•	•		•		
University Computing Co.	•	30, 120, Others	•				Chicago, IL New York, NY	
Warner Computer Systems, Inc.	•	10, 30, 120	•					
Salt Lake City, UT	ADP Network Services, Inc.	•	10, 30					Denver, CO Wilmington, MA Denver, CO
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	200, 240, 480	•				
	Bowne Information Systems, Inc.	•	15, 30					San Francisco, CA Los Angeles, CA New York, NY
	CallData Systems, Inc.	•	10, 15, 30					
	Citishare	•	30, 120					
	Computer Usage Company	•	10, 15, 30, Others					San Francisco, CA San Francisco, CA San Francisco, CA
	Data Resources, Inc.	•	30	•				
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				
	Honeywell DATANETWORK	•	10, 30, 120, Others		•			
	Informatics Inc.	•	10, 15, 30	•			•	San Francisco, CA Chicago, IL Denver, CO
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				
	National CSS, Inc.	•	30					
	On-Line Systems, Inc.	•	10, 30					Los Angeles, CA San Francisco, CA Denver, CO
	Rapidata, Inc.	•	10, 15, 30, 60, 120					
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				
	Service Bureau Company	•	10, 15, 30, 250, 600	•				San Francisco, CA El Segundo, CA New York, NY
	University Computing Co.	•	30, Others	•				
	Warner Computer Systems, Inc.	•	10, 30, 120	•				
	San Antonio, TX	ADP Network Services, Inc.	•	10, 30				
Avco Computer Services		•	10, 15, 30, 120, Others	•				
Boeing Computer Services Co.		•	200, 240, 480	•				
CallData Systems, Inc.		•	10, 15, 30					
Citishare		•	30, 120					
Computer Usage Company		•	10, 15, 30, Others					
Data Resources, Inc.	•	30	•					
(Continued...)								

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# Toll-Free Reference Chart for Remote Computing Services

XX.097

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
San Diego, CA	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Houston, TX
	Honeywell DATANETWORK	•	10, 30, 120, Others				•	Austin, TX
	Informatics Inc.	•	10, 15, 30	•				Los Angeles, CA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL
	National CSS, Inc.	•	30					Houston, TX
	On-Line Systems, Inc.	•	10, 30					Dallas, TX
	Rapidata, Inc.	•	10, 15, 30, 60, 120					Atlanta, GA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Houston, TX
	Service Bureau Company	•	10, 15, 30, 250, 600	•		4	•	Houston, TX
	Time Sharing Resources	•	30, Others	•				Houston, TX
	University Computing Co.	•	30, Others	•				Houston, TX
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30	•	•			
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Los Angeles, CA
	Boeing Computer Services Co.	•	30, 120, Others	•				El Segundo, CA
	Bowne Information Systems, Inc.	•	15, 30					Los Angeles, CA
	CallData Systems, Inc.	•	10, 15, 30					Los Angeles, CA
	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					Newport Beach, CA
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			
	Data Resources, Inc.	•	30	•				San Francisco, CA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Newport Beach, CA
	Honeywell DATANETWORK	•	10, 30, 120, Others		•			
	Informatics Inc.	•	10, 15, 30	•			•	Los Angeles, CA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL
	Interactive Market Systems, Inc.	•	10, 30	•				Los Angeles, CA
	National CSS, Inc.	•	10, 13.4, 30					
	On-Line Systems, Inc.	•	10, 30					
	Rapidata, Inc.	•	10, 15, 30, 60, 120					Los Angeles, CA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Los Angeles, CA
	Service Bureau Company	•	10, 15, 30, 250, 600	•	•		•	Los Angeles, CA
	Time Sharing Resources	•	30, Others	•		4	•	
	United Computing Systems	•	10, 30, 120		•			Los Angeles, CA
	University Computing Co.	•	30, Others	•				El Segundo, CA
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Los Angeles, CA
	Boeing Computer Services Co.	•	30, 120, Others	•	•	17	•	
	Bowne Information Systems, Inc.	•	15, 30, 120	•	•	7		
	CallData Systems, Inc.	•	10, 15, 30, 120	•	•	4		
	Citishare	•	30, 120					New York, NY
	Computer Sharing Services, Inc.	•	10, 30, 120, Others	•	•		•	
	Computer Usage Company	•	10, 15, 30, Others	•	•	8	•	
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			
	Data Resources, Inc.	•	30	•	•	12	•	
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30, Others	•	•		•	Chicago, IL
	INSCO Systems	•	10, 14.7, 15, 30, 120	•	•			
	Interactive Data Corporation	•	10, 15, 30, Others	•	•		•	
	Interactive Market Systems, Inc.	•	10, 30	•				Los Angeles, CA
	I.P. Sharp Associates, Inc.	•	15, 30, 120	•	•	3		
	Martin Marietta Data Systems	•	30, 120, 240, 480	•	•	1	•	

(Continued...)





# Toll-Free Reference Chart for Remote Computing Services

XX.098

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
San Jose, CA	McDonnell Douglas	•	10, 30, 120, Others	•	•	10	•	Los Angeles, CA
	National CSS, Inc.	•	120, Others	•	•		•	
	On-Line Systems, Inc.	•	10, 30, 14.8, 15, 120	•	•	12	•	
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•	•	6	•	
	Ross Systems, Inc.	•	30, 120	•	•	4	•	Los Angeles, CA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, 120, Others	•	•		•	
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•	
	Time Sharing Resources	•	30, Others	•	•	4	•	
	United Computing Systems	•	10, 30, 120	•	•		•	New York, NY
	University Computing Co.	•	30, 120, Others	•	•	5		
	Warner Computer Systems, Inc.	•	10, 30, 120	•				
	ADP Network Services, Inc.	•	10, 30	•				San Francisco, CA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Los Angeles, CA
	Boeing Computer Services Co.	•	200, 240, 480	•				Sunnyvale, CA
Seattle, Everett, WA	Bowne Information Systems, Inc.	•	15, 30	•				San Francisco, CA
	CallData Systems, Inc.	•	10, 15, 30	•				Los Angeles, CA
	Citishare	•	30, 120	•				New York, NY
	Computer Usage Company	•	10, 15, 30, Others	•	•	8	•	San Francisco, CA
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•				
	Data Resources, Inc.	•	30	•				
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			Chicago, IL
	Informatics Inc.	•	10, 15, 30	•	•		•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				
	Interactive Market Systems, Inc.	•	10, 30	•				
	McDonnell Douglas	•	10, 30, 120, Others	•	•	6	•	Sunnyvale, CA
	National CSS, Inc.	•	120, 240, Others	•			•	
	On-Line Systems, Inc.	•	10, 30	•				
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•	•	6	•	
	Ross Systems, Inc.	•	30, 120	•	•	1	•	San Francisco, CA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•	•			
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•				
	Time Sharing Resources	•	30, Others	•		4	•	
	University Computing Co.	•	30, 120, Others	•				Los Angeles, CA
	Warner Computer Systems, Inc.	•	10, 30, 120	•				San Francisco, CA
								New York, NY
	ADP Network Services, Inc.	•	10, 30, 120	•	•			Olympia, WA
	Allied Data	•	300, 120, 480	•				
	Avco Computer Services	•	10, 15, 30, 120, Others	•				
	Boeing Computer Services Co.	•	10, 15, 30, 120, Others	•	•	23	•	
	Bowne Information Systems, Inc.	•	15, 30	•				San Francisco, CA
	CallData Systems, Inc.	•	10, 15, 30, 120	•				San Francisco, CA
	Citishare	•	30, 120	•				New York, NY
	Computer Usage Company	•	10, 15, 30, Others	•				San Francisco, CA
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•	San Francisco, CA
	Data Resources, Inc.	•	30	•				
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•				San Francisco, CA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				
	I.P. Sharp Associates, Inc.	•	15, 30, 120	•	•	2		
	Key Data Inc.	•	30, 120	•	•	11		
	McDonnell Douglas	•	10, 30, 120, Others	•	•	7	•	Chicago, IL
	National CSS, Inc.	•	10, 13.4, 30, 120	•			•	

(Continued...)



# Toll-Free Reference Chart for Remote Computing Services

XX.099

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
Springfield, Chicopee, Holyoke MA-CT	On-Line Systems, Inc.	•	30					Los Angeles, CA
	Rapidata, Inc.	•	10, 15, 30, 60, 120					San Francisco, CA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				San Francisco, CA
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•	
	Time Sharing Resources	•	30, Others	•		4	•	Los Angeles, CA
	United Computing Systems	•	10, 30	•	•			
	University Computing Co.	•	30, 120, Others	•		5	•	Bellevue, WA
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30					Hartford, CT
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	200, 240, 480	•				Wellesley, MA
	CallData Systems, Inc.	•	10, 15, 30					Boston, MA
	Citishare	•	30, 120					New York, NY
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Hartford, CT
	Honeywell DATANETWORK	•	10, 30, 120, Others					Worcester, MA
	Informatics Inc.	•	10, 15, 30				•	New York, NY
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				New York, NY
	National CSS, Inc.	•	10, 13.4, 30					Cambridge, MA
	On-Line Systems, Inc.	•	10, 14.8, 15, 30					Boston, MA
	Rapidata, Inc.	•	10, 15, 30, 60, 120					Hartford, CT
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Boston, MA
	Service Bureau Company	•	10, 15, 30, 250, 600	•				Boston, MA
	University Computing Co.	•	30, Others	•				Waltham, MA
	Warner Computer Systems, Inc.	•	10, 30, 120	•				Stamford, CT
Syracuse, NY	ADP Network Services, Inc.	•	10, 30					Buffalo, NY
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	200, 240, 480	•				New York, NY
	CallData Systems, Inc.	•	10, 15, 30					New York, NY
	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					New York, NY
	Data Resources, Inc.	•	30	•				New York, NY
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others					Rochester, NY
	Informatics Inc.	•	10, 15, 30	•			•	New York, NY
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				New York, NY
	National CSS, Inc.	•	10, 13.4, 30					Stamford, CT
	On-Line Systems, Inc.	•	10, 14.8, 15, 30					Rochester, NY
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•				Boston, MA
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				White Plains, NY
	Service Bureau Company	•	10, 15, 30, 250, 600	•				Rochester, NY
	University Computing Co.	•	30, Others	•				New York, NY
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
Tampa, St. Petersburg, FL	ADP Network Services, Inc.	•	10, 30					Atlanta, GA
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Shalimar, FL
	Boeing Computer Services Co.	•	200, 240, 480	•				Atlanta, GA
	CallData Systems, Inc.	•	10, 15, 30					Atlanta, GA
	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					Atlanta, GA
	Data Resources, Inc.	•	30	•				Houston, TX
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others		•			

(Continued...)



# Toll-Free Reference Chart for Remote Computing Services

XX.100

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
Toledo, OH-MI	Informatics Inc.	•	10, 15, 30	•			•	McLean, VA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Neptune, NJ
	McDonnell Douglas	•	10, 30, 120, Others	•	•	5	•	
	On-Line Systems, Inc.	•	10, 30					Toronto, ONT
	Rapidata, Inc.	•	10, 15, 30, 60, 120					Ft. Lauderdale, FL
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Chapel Hill, NC
	Service Bureau Company	•	10, 15, 30, 250, 600	•				Miami, FL
	Time Sharing Resources	•	30, Others	•	•	5	•	Miami, FL
	United Computing Systems	•	10, 30, 120	•	•			
	University Computing Co.	•	30, Others	•	•	3	•	
Toledo, OH-MI	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30	•	•			
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Dayton, OH
	Boeing Computer Services Co.	•	200, 240, 480	•				Dearborn, MI
	CallData Systems, Inc.	•	10, 15, 30					Chicago, IL
	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•				Detroit, MI
	Data Resources, Inc.	•	30	•				Pittsburgh, PA
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•				Detroit, MI
Toronto, ONT	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30	•			•	Fairfield, NJ
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL
	National CSS, Inc.	•	10, 13.4, 30					Cleveland, OH
	On-Line Systems, Inc.	•	10, 14.8, 15, 30					Cleveland, OH
	Rapidata, Inc.	•	10, 15, 30, 60, 120					Chicago, IL
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Detroit, MI
	Service Bureau Company	•	10, 15, 30, 250, 600	•				Detroit, MI
	University Computing Co.	•	30, Others	•				Troy, MI
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
Toronto, ONT	ADP Network Services, Inc.	•	10, 30, 120					Ann Arbor, MI
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	CallData Systems, Inc.	•	10, 15, 30					Chicago, IL
	Citishare	•	30, 120					New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			
	Data Resources, Inc.	•	15, 30	•	•	7		
	General Electric, Canadian	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30	•	•			
	INSCO Systems	•	10, 30	•	•			
	(I.D.C.) Chase Manhattan Limited	•	30	•	•		•	
Tulsa, OK	Interactive Market Systems, Inc.	•	10, 30	•		3	•	
	I.P. Sharp Associates, Ltd.	•	15, 30, 120	•	•	100		
	National CSS, Inc.	•	30					Stamford, CT
	OLS Comp. Serv. Can. Ltd.	•	10, 14.8, 30	•	•	1		
	Rapidata, Inc.	•	10, 15, 30					Boston, MA
	Scientific Time Sharing Corp.	•	10, 14.9, 30	•	•		•	Boston, MA
	Service Bureau Company	•	10, 15, 30, 250, 600	•	•		•	
	University Computing Co.	•	30, Others	•	•	3	•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30, 120					St. Louis, MO
Tulsa, OK	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA

(Continued...)



# Toll-Free Reference Chart for Remote Computing Services

**XX.101**

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
<b>Vancouver, BC</b>	Boeing Computer Services Co.	•	30, Others	•				Wichita, KS
	CallData Systems, Inc.	•	10, 15, 30, 120	•				Dallas, TX
	Citishare	•	30, 120					New York, NY
	Computer Usage Company	•	10, 15, 30, Others					Atlanta, GA
	Data Resources, Inc.	•	10, 30	•				Houston, TX
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others		•			
	Informatics Inc.	•	10, 15, 30	•			•	Los Angeles, CA
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Chicago, IL
	McDonnell Douglas	•	10, 30, 120, Others	•	•	5	•	
	National CSS, Inc.	•	30					Dallas, TX
	On-Line Systems, Inc.	•	10, 30					Dallas, TX
	Rapidata, Inc.	•	10, 15, 30, 60, 120					Chicago, IL
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•				Dallas, TX
	Service Bureau Company	•	15, 30, 250, 600	•				Houston, TX
	United Computing Systems	•	10, 30, 120	•	•		•	
	University Computing Co.	•	30, 120, Others	•	•	5	•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30					Ann Arbor, MI
	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
<b>Washington, DC-MD-VA</b>	Boeing Computer Services Co.	•	30, 120	•	•	6	•	
	Citishare	•	30, 120					New York, NY
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			
	Data Resources, Inc.	•	10, 15, 30	•				Toronto, ONT
	General Electric, Canadian	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30					Toronto, ONT
	INSCO Systems	•	10, 30					Chicago, IL
	OLS Comp. Serv. Can. Ltd.	•	30					Toronto, ONT
	Scientific Time Sharing Corp.	•	14.9, 30	•				San Francisco, CA
	University Computing Co.	•	30, Others	•				Bellevue, WA
	Warner Computer Systems, Inc.	•	10, 30, 120	•				New York, NY
	ADP Network Services, Inc.	•	10, 30, 120	•	•		•	
	Avco Computer Services	•	10, 15, 30, 120, Others	•	•	3		
	Boeing Computer Services Co.	•	10, 15, 30, 120, Others	•		34	•	Vienna, VA
	Bowne Information Systems, Inc.	•	15, 30, 120		•	24		
	CallData Systems, Inc.	•	10, 15, 30, 120	•	•	15		
	Citishare	•	30, 120					New York, NY
	Computer Sharing Services, Inc.	•	10, 30, 120, Others	•	•		•	
	Computer Usage Company	•	10, 15, 30, Others					Atlanta, GA
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•			
	Data Resources, Inc.	•	30, 120	•	•	52	•	
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•			
	Informatics Inc.	•	10, 15, 30, Others	•	•		•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•				Neptune, NJ
	Interactive Data Corporation	•	10, 15, 30, 120, Others	•	•		•	
	Interactive Market Systems, Inc.	•	10, 30	•				Atlanta, GA
	I.P. Sharp Associates, Inc.	•	15, 30, 120		•	3		
	Martin Marietta Data Systems	•	30, 120, 240, 480	•	•	4	•	
	McDonnell Douglas	•	10, 30, 120, Others	•	•	25	•	
	National CSS, Inc.	•	120, 480, Others				•	
	On-Line Systems, Inc.	•	10, 14.8, 15, 30, 120	•	•	6	•	
	PRC Computer Center, Inc.	•	10, 15, 30, 120, Others	•		250	•	McLean, VA

(Continued...)

# Toll-Free Reference Chart for Remote Computing Services

XX.102

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
Wilmington, DE-NJ-MD	Rapidata, Inc.	•	10, 15, 30, 60, 120	•	•	10	•	Piscataway, NJ
	Scientific Time Sharing Corp.	•	10, 14.9, 30, 120, Others	•	•	119	•	
	Service Bureau Company	•	10, 15, 30, 120, 250, 600	•	•		•	Falls Church, VA New York, NY
	Sun Information Services Co.	•	10, 15, 30, 120, Others	•	•	5	•	
	Time Sharing Resources	•	30, Others	•	•	6	•	
	United Computing Systems	•	10, 30, 120	•	•		•	
	University Computing Co.	•	30, 120, Others	•	•	2	•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•	•		•	
	ADP Network Services, Inc.	•	10, 30	•	•		•	Philadelphia, PA Rockaway, NJ Philadelphia, PA Washington, D.C. New York, NY Philadelphia, PA Washington, D.C. Philadelphia, PA Philadelphia, PA Fairfield, NJ Neptune, NJ Silver Springs, MD Washington, D.C. Philadelphia, PA Philadelphia, PA Short Hills, NJ New York, NY
	Avco Computer Services	•	10, 15, 30, 120, Others	•	•		•	
	Boeing Computer Services Co.	•	200, 240, 480	•	•		•	
	Calldata Systems, Inc.	•	10, 15, 30	•	•		•	
	Citishare	•	30, 120	•	•		•	
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•	
	Data Resources, Inc.	•	30	•	•		•	
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•		•	
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•		•	
	Informatics Inc.	•	10, 15, 30, 120	•	•		•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•	•		•	
	On-Line Systems, Inc.	•	10, 14.8, 15, 30	•	•		•	
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•	•		•	
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•	•		•	
	Service Bureau Company	•	10, 15, 30, 250, 600	•	•		•	
	University Computing Co.	•	30, Others	•	•		•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•	•		•	
Winnipeg, MAN	ADP Network Services, Inc.	•	10, 30	•	•		•	Ann Arbor, MI Wilmington, MA
	Avco Computer Services	•	10, 15, 30, 120, Others	•	•		•	
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•	•		•	
	General Electric, Canadian	•	10, 30, 120, Others	•	•		•	
	Honeywell DATANETWORK	•	10, 30	•	•		•	Toronto, ONT Chicago, IL
	INSCO Systems	•	10, 30	•	•		•	
	I.P. Sharp Associates Ltd.	•	15, 30, 120	•	•	2	•	Detroit, MI Detroit, MI New York, NY
	On-Line Systems, Inc.	•	30	•	•		•	
	Scientific Time Sharing Corp.	•	30	•	•		•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•	•		•	
Youngstown, Warren, OH	ADP Network Services, Inc.	•	10, 30	•	•		•	Cleveland, OH Dayton, OH Cleveland, OH Chicago, IL Pittsburgh, PA Akron, OH Fairfield, NJ Chicago, IL Pittsburgh, PA Chicago, IL Detroit, MI Cleveland, OH Troy, MI New York, NY
	Avco Computer Services	•	10, 15, 30, 120, Others	•	•		•	
	Boeing Computer Services Co.	•	200, 240, 480	•	•		•	
	Calldata Systems, Inc.	•	10, 15, 30	•	•		•	
	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•		•	
	Honeywell DATANETWORK	•	10, 30, 120, Others	•	•		•	
	Informatics Inc.	•	10, 15, 30	•	•		•	
	INSCO Systems	•	10, 14.7, 15, 30, 120	•	•		•	
	On-Line Systems, Inc.	•	10, 14.8, 15, 30	•	•		•	
	Rapidata, Inc.	•	10, 15, 30, 60, 120	•	•		•	
	Scientific Time Sharing Corp.	•	10, 14.9, 30, Others	•	•		•	
	Service Bureau Company	•	30, 250, 600	•	•		•	
	University Computing Co.	•	30, Others	•	•		•	
	Warner Computer Systems, Inc.	•	10, 30, 120	•	•		•	

(Continued...)

**Toll-Free Reference Chart  
for  
Remote Computing Services**

XX.103

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
<b>ALASKA</b>	Avco Computer Services	•	10, 15, 30, 120, Others	•				Wilmington, MA
	Boeing Computer Services Co.	•	10, 30, 120	•	•	7	•	New York, NY
	Calldata Systems, Inc.	•	10, 15, 30					Seattle, WA
	Citishare	•	30, 120					Seattle, WA
	CSC/INFONET	•	10, 14.8, 30, 120, 480	•				Los Angeles, CA
<b>AUSTRALIA</b>	General Electric Info. Serv. Co.	•	10, 30, 120, Others	•	•			
	Honeywell DATANETWORK	•	10, 30, 120, Others					
	Rapidata, Inc.	•	10, 15, 30					
	CSC/INFONET							
	Sydney	•	10, 14.8, 30, 120, 480	•	•			
<b>AUSTRIA</b>	GE Information Services, Pty. Ltd.							
	Adelaide	•	30, Others					Sydney, Australia
	Brisbane	•	30, Others					Sydney, Australia
	Canberra	•	30					Sydney, Australia
	Melbourne	•	30, Others					Sydney, Australia
<b>BELGIUM</b>	Sydney	•	30, Others		•			
	OLS Comp. Serv. UK Ltd.							
	All Cities	•	10, 30					London, U.K.
	GE Informations-Service Ges.mbH							
	Linz	•	30					Vienna, Austria
<b>DENMARK</b>	Vienna	•	30, 120		•			
	OLS Comp. Serv. UK Ltd.							
	All Cities	•	10, 30					London, U.K.
	ADP Network Services, Inc.							
	Brussels	•	10, 30, 120		•			
<b>DENMARK</b>	Antwerp	•	10, 30, 120					
	CSC/INFONET							
	Brussels	•	10, 15, 30, 120, 480	•	•			
	Data Resources, Inc.							
	All Cities	•	10, 30	•	•	12		
<b>DENMARK</b>	General Time Share SA							
	Antwerp	•	30					Brussels, Belgium
	Brussels	•	30, 120, 240		•			
	Liege	•	10, 30					Brussels, Belgium
	Luxembourg	•	30					Brussels, Belgium
<b>DENMARK</b>	OLS Comp. Serv. UK Ltd.							
	All Cities	•	10, 30					London, U.K.
	Service Bureau Company							
	Brussels	•	30, Others					
	Data Resources, Inc.							
<b>DENMARK</b>	All Cities	•	10, 30	•				Brussels, Belgium
	GE - Ok Data							
	Copenhagen	•	30, 120, 240		•			
	OLS Comp. Serv. UK Ltd.							
	All Cities	•	10, 30					London, U.K.
<b>DENMARK</b>	Service Bureau Company							
	Copenhagen	•	30, Others					

(Continued...)





# Toll-Free Reference Chart for Remote Computing Services

XX.104

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
<b>FINLAND</b>	Data Resources, Inc. All Cities	•	10, 30	•				Brussels, Belgium
	GE - Oy Nokia, AB Elektronikka Helsinki	•	30, 120, 240		•			Helsinki, Finland
	Jyuaskylia	•	30					Helsinki, Finland
	Tampere	•	30					Helsinki, Finland
	Turku	•	30					
<b>FRANCE</b>	OLS Comp. Serv. UK Ltd. All Cities	•	10, 30					London, U.K.
	CSC/INFONET Paris	•	10, 15, 30, 120, 480	•	•			
	Data Resources, Inc. All Cities	•	10, 30	•				Brussels, Belgium
	GE Information Services SA Amiens	•	30					Paris, France
	Angers	•	30					Paris, France
	Bordeaux	•	10, 30					Paris, France
	Brest	•	30					Paris, France
	Caen	•	30					Paris, France
	Clermont-Ferrand	•	30					Paris, France
	Dijon	•	30					Paris, France
	Le Havre	•	30					Paris, France
	Lille	•	30					Paris, France
	Lyon	•	30					Paris, France
	Marseille	•	30					Paris, France
	Nancy	•	10, 30					Paris, France
	Nantes	•	30					Paris, France
	Nice	•	30					Paris, France
	Paris	•	30, 120, 240, 480		•			Paris, France
	Pau	•	30					Paris, France
	Reims	•	30					Paris, France
	Rennes	•	30					Paris, France
	Rouen	•	10, 30					Paris, France
	St. Etienne	•	30					Paris, France
	Strasbourg	•	30					Paris, France
	Toulouse	•	30					Paris, France
<b>GERMANY</b>	OLS Comp. Serv. UK Ltd. All Cities	•	10, 30					London, U.K.
	Service Bureau Company Paris	•	30, Others					
	ADP Network Services, Inc. Cologne	•	10, 30					
	Essen	•	10, 30, 120		•			
	Frankfurt	•	10, 30, 120		•			
	Boeing Computer Services Co. All Cities	•	30	•				Frankfurt, Germany
	CSC/INFONET Frankfurt	•	10, 15, 30, 120, 480	•	•			
	Data Resources, Inc. All Cities	•	10, 30	•				Brussels, Belgium
	GE Informations-Service GmbH Cologne	•	30, 120, 240		•			Cologne, Germany
	Dortmund	•	30					

(Continued...)

**Toll-Free Reference Chart  
for  
Remote Computing Services**

XX.105

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
	Dusseldorf	•	30					Cologne, Germany
	Frankfurt	•	30, 120, 240					Cologne, Germany
	Hamburg	•	30, 120, 240					Cologne, Germany
	Hannover	•	30					Cologne, Germany
	Mannheim	•	30, 120, 240					Cologne, Germany
	Munich	•	30, 120, 240					Cologne, Germany
	Nurenberg	•	30					Cologne, Germany
	Saarbruecken	•	30					Cologne, Germany
	Stuttgart	•	30, 120, 240					Cologne, Germany
	OLS Comp. Serv. UK Ltd. All Cities	•	10, 30					London, U.K.
	Service Bureau Company Dusseldorf	•	30, Others					
	Frankfurt	•	30, Others					
	Hamburg	•	30, Others					
	Munich	•	30, Others					
	Stuttgart	•	30, Others					
	HONG KONG							
	Data Resources, Inc.	•	10, 30	•				Brussels, Belgium
	GE Technical Services Co.	•	30, 120		•			
	On-Line Systems, Inc.	•	10, 30					Los Angeles, CA
	Service Bureau Company	•	30, Others					
	IRELAND							
	GEISCO, Ltd. Dublin	•	30, 120, 240		•			
	ISRAEL							
	OLS Comp. Serv. UK Ltd.	•	10, 30					London, U.K.
	ITALY							
	ADP Network Services, Inc. Milan	•	10, 30, 120		•			
	Rome	•	10, 30, 120		•			
	CSC/INFONET Milan	•	10, 15, 30, 120, 480	•	•			
	GE Information Services SpA Bari	•	30					Milan, Italy
	Bergamo	•	30					Milan, Italy
	Bologna	•	30					Milan, Italy
	Brescia	•	30					Milan, Italy
	Florence	•	30					Milan, Italy
	Genoa	•	30					Milan, Italy
	Livorno	•	30, 240					Milan, Italy
	Milan	•	30, 120, 240		•			
	Naples	•	30					Milan, Italy
	Padua	•	30					Milan, Italy
	Palermo	•	30					Milan, Italy
	Rome	•	30, 240					Milan, Italy
	Turin	•	30, 240					Milan, Italy
	OLS Comp. Serv. UK Ltd. All Cities	•	10, 30					London, U.K.
	Service Bureau Company Milan	•	30, Others					
(Continued...)								

**Toll-Free Reference Chart  
for  
Remote Computing Services**

XX.106

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
JAPAN	GE - ISI Dentsu Ltd.	•						
	Fukuoka	•	30					Tokyo, Japan
	Hiroshima	•	30					Tokyo, Japan
	Nagoya	•	30					Tokyo, Japan
	Osaka	•	30					Tokyo, Japan
	Sapporo	•	30					Tokyo, Japan
	Shizuoka	•	30					Tokyo, Japan
	Tokyo	•	30, 120, 240		•			Tokyo, Japan
	Yokohama	•	30, 120					Tokyo, Japan
	Service Bureau Company							
MEXICO	Osaka	•	30, Others					
	Tokyo	•	30, Others					
NETHERLANDS	GE - Tiempo Compartido, S.A.	•	30, 120		•			
	Mexico City	•	30					Mexico City, Mexico
	Monterrey							
NORWAY	ADP Network Services, Inc.	•						
	Amsterdam	•	10, 30, 120					
	The Hague	•	10, 30, 120					
	Rotterdam	•	10, 30					
	Data Resources, Inc.	•		•				Brussels, Belgium
	All Cities	•	10, 30					
	GE Information Services BV	•			•			Amsterdam, Netherlands
	Amersfoort	•	30					
	Amsterdam	•	30, 120, 240					Amsterdam, Netherlands
	Arnhem	•	30					Amsterdam, Netherlands
	Rotterdam	•	30					Amsterdam, Netherlands
	Zoetermeer	•	30, 120					
PHILIPPINES	Service Bureau Company	•	30, Others					
	The Hague							
PUERTO RICO	Data Resources, Inc.	•		•				Brussels, Belgium
	All Cities	•	10, 30					
	GE (USA) Information Services A/S	•			•			London, U.K.
	Bergen	•	30					
	Oslo	•	30, 120, 240					
NORWAY	Stavanger	•	30					
	OLS Comp. Serv. UK Ltd.	•						
	All Cities	•	10, 30					
PHILIPPINES	Manila	•	10, 30	•				Brussels, Belgium
	OLS Comp. Serv. UK Ltd.	•						
	All Cities	•	10, 30					London, U.K.
PUERTO RICO	GE Information Services Co.	•			•			San Juan, Puerto Rico
	San Juan	•	30, 120, 240					
	Ponce	•	30					
	OLS Comp. Serv. UK Ltd.	•						
	All Cities	•	10, 30					London, U.K.
(Continued...)								



# Toll-Free Reference Chart for Remote Computing Services

**XX.107**

METROPOLITAN AREA	REMOTE-COMPUTING COMPANIES SERVICING THIS AREA	TOLL-FREE TELEPHONE SERVICE			LOCAL OFFICE			LOCATION OF NEAREST OFFICE IF NONE LOCALLY
		Yes •	Line Speeds Offered for Computer Access (Characters per Second)	Toll- Free "Hot Line" •	Yes •	No. of Local Personnel	Remote- Batch Terminal Available •	
<b>SCOTLAND</b>	ADP Network Services, Inc. Edinburgh Glasgow	• •	10, 30		• •			
<b>SINGAPORE</b>	Data Resources, Inc. GE Electrical Technical Services Co. OLS Comp. Serv. UK Ltd.	• • •	10, 30 30, 120, 240 10, 30	•				Brussels, Belgium London, U.K.
<b>SOUTH AFRICA</b>	CSC/INFONET Johannesburg	•	10, 15, 30, 120, 480	•	•			
<b>SPAIN</b>	CSC/INFONET Madrid Data Resources, Inc. All Cities GE (USA) Information Services SA Madrid OLS Comp. Serv. UK Ltd. All Cities	• • • • • •	10, 15, 30, 120, 480 10, 30 30 10, 30	• • •	• •			Brussels, Belgium London, U.K.
<b>SWEDEN</b>	Data Resources, Inc. All Cities GE (USA) Information Services AB Goteborg Malmo Stockholm OLS Comp. Serv. UK Ltd. All Cities Service Bureau Company Stockholm	• • • • • • • •	10, 30 30, 120, 240 30, 120, 240 30, 120, 240 10, 30 30, Others	• • •				Brussels, Belgium Stockholm, Sweden Stockholm, Sweden London, U.K.
<b>SWITZERLAND</b>	Data Resources, Inc. All Cities GE Information Services AG Geneva Zurich OLS Comp. Serv. UK Ltd. All Cities Service Bureau Company Zurich United Computing Systems Zurich	• • • • • • •	10, 30 30 30, 240 10, 30 30, Others 10, 30	• • •				Brussels, Belgium Zurich, Switzerland London, U.K.
<b>U.K.</b>	ADP Network Services, Inc. Andover Birmingham Bristol Durham Edinburg Glasgow	• • • • • • •	10, 30 10, 30 10, 30 10, 30 10, 30 10, 30	• • • • • •	• • • • • •			

(Continued...)



## Toll-Free Reference Chart for Remote Computing Services

XX.108

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AN EXTRACT FROM

**A COMPARATIVE ANALYSIS  
OF FINANCIAL REPORTING AND MODELING SYSTEMS**

May, 1978

**PREPARED BY:** Real Decisions Corporation, 870 High Ridge Road, Stanford, CT 06905, 203/329-2071.

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## PREFACE

This Extract has been taken from the Second Edition of the report entitled A Comparative Analysis of Financial Reporting and Modeling Systems published by Real Decisions Corporation in November, 1977. RDC has used its best efforts to ensure the accuracy of the information contained herein. The processes described in this Extract should be viewed as only one factor in evaluating any given vendor's capabilities. Vendors and systems included in this Extract are:

<u>Vendor Name</u>	<u>Location</u>	<u>System Name</u>
ADP Network Services	Ann Arbor, MI	FML
*Boeing Computer Services	Morristown, NJ	EIS
*CallData Systems	Woodbury, NY	CALLPLAN
CompuServe	Columbus, OH	CUFFS
*Computer Sciences	El Segundo, CA	FLARES
Comshare	Ann Arbor, MI	FCS
Control Data	Minneapolis, MN	IFPS
Data Resources	Lexington, MA	EPS
General Electric	Rockville, MD	FAL II
Informatics	Fairfield, NJ	SIMPLAN
Interactive Data	Waltham, MA	XSIM
National CSS	Norwalk, CT	EMS
On-Line Systems	Pittsburgh, PA	OLSFMS, PAMS
Rapidata	Fairfield, NJ	FISCAL
*Ross Systems	Palo Alto, CA	MAPS
Scientific Time Sharing	Bethesda, MD	FPS
Service Bureau	Greenwich, CT	PROPHIT II
*Time Sharing Resources	Great Neck, NY	INSIGHT
Tymshare	Cupertino, CA	BBL, EXPRESS
United Computing Systems	Kansas City, MO	FORESIGHT

\*These vendors and systems do not appear in the first edition of A Comparative Analysis of Financial Reporting and Modeling Systems published in April, 1977.

## INTRODUCTION

There has been an increasing movement by users of Remote Computer Services (RCS) towards the use of various application packages. One of the application areas growing most rapidly is that of financial systems. As a consulting firm, Real Decisions Corporation (RDC) recognized the necessity for RCS users to understand the alternatives available in this field. For this reason, RDC developed its first published report on application packages--A Comparative Analysis of Financial Reporting and Modeling Systems--so that it will assist users in evaluating such packages, including comparison of costs.

A financial system package has many aspects that a user should consider in his evaluation. For instance, a user should examine his need and determine whether he requires the ability to interface with other data bases or statistical packages. He should also be concerned with the quality of documentation and technical assistance offered with his financial reporting and modeling system, as well as any special features which are peculiar to his problems. Although these and many other things are important in his decision, a user must first determine the exact type of reporting and modeling he will be doing. Once these requirements are defined, the user can investigate the financial systems offered by vendors. These range from the more limited "fixed" packages to the more powerful and flexible "high-level" languages. The user should select a package that will meet his needs and fulfill his ease of use requirements. This is where the Benchmark Problems and Analysis section of the RDC report will be most valuable. It not only deals with different application problems and their cost comparisons, but gives the user a flavor of how easy or difficult the system is to use and whether it conforms to his standards.

The Benchmark Problems and Analysis section of the report deals with seven common user applications:

- New Product Planning
- Consolidations of Financial Results
- Cash Flow Projections
- Project Financing
- Long Range Plan
- Sales Driven Model
- Econometric Exercise

This set of problems was assembled by RDC with the invaluable assistance of two members of ATSU and other individuals with particular expertise in financial modeling systems. RDC ran the benchmarks on four different systems to fine tune the models and the approach prior to sending the problems to the vendors. The vendors were asked to code and run the problems on their systems in order to insure an accurate representation of them.

This extract will deal with portions of the New Product Planning problem. The problem concerns an evaluation of the profitability of a new product over the next four years. As can be seen by the complete statement of the problem on the following pages, the model is simple and straight forward. The vendors were asked to show how the data and logic files were read-in and displayed, how a formal report may be printed, and finally show how to perform sensitivity analyses. The costs in the CPU Cost Comparison Chart are expressed as their real values and as a percentage of the highest vendor. These percentages are highlighted in the subsequent bar charts for runs 1 and 4. Also included is a sample display of the actual coding used by the sixteen systems in the comparative analysis to solve the sensitivity analysis question (run 4). The sample code should show the user the general style of each system. The extract concludes with a summary that discusses the other features of the full report.

The following vendors/systems reported significant changes since the first edition of the report:

- CompuServe/CUFFS - Costs were reduced through a combination of a redesign of the models for more efficient operation, and a change in the pricing algorithm.
- Control Data/IFPS - Models were rewritten and rerun, reflecting some changes in both efficiency and readability.
- Data Resources/EPS - Models were rerun, reflecting hardware and software changes over the period.
- General Electric/FAL II - General price increase is reflected in the CPU costs.
- Interactive Data/XSIM - General price increase is reflected in the CPU costs.
- On-Line Systems/PAMS - Models were redesigned and software was modified, reflecting substantially lower costs.
- Rapidata/FISCAL - More detail costs were made available, and a general price increase is reflected in the CPU costs.
- Scientific TS/FPS - Redesign of models to operate under new version of software caused significant cost reduction.
- Tymshare/EXPRESS - Complete redesign and rerun of models reduced costs substantially.

## NEW PRODUCT PROBLEM

As an example from the full report, portions of the New Product Planning problem are exhibited here. The basic model is set up to evaluate the profitability of a new product over the next four years. The model is simple and the code necessary to run part of the model is included on this problem to show the user the general style of each system. In addition, the use of "What-If" analysis is featured with both selected and complete print out of the model.

The New Product Planning problem is described as follows:

Marketing Research is evaluating the profitability of a new product over the next four years.

Units sold are anticipated to be 50,000 increasing by 15% per year. The selling price of \$8.50 increased \$0.05 per year after the initial year.

Variable costs per unit included in the cost of goods sold are as follows:

1. Raw Materials = \$3.00
2. Direct Labor = \$2.00
3. Packaging = \$0.50
4. Distribution = \$0.75

Inflation over the next three years is expected to be 7%, 8%, and 6%. Fixed costs involved in releasing the product fall into two categories:

1. Factory = \$25,000
2. Other = \$15,000

Administration feels that these costs can be held constant over the four years, even in the face of inflation. The effective tax rate is 22%.

The vendors were required to show how the data and logic files are read-in and displayed and how a formal report is printed on each system. Also requested were several sensitivity analyses to be done with complete and partial print outs. Individual CPU Costs were taken for each "run" and exhibited in comparative charts. This extract is concerned with runs 1 and 4. Run 1 involves coding and solving the complete problem with the entire model being printed out in a formal report. Run 4 is a "What-If" type question which shows the effect of changing the number of units sold over a range from -10% to 5% (stepped sensitivity). Instead of displaying the entire model as in Run 1, though, Run 4 requires only selected rows to be printed out. The specific information included on the following pages is:

- CPU costs for new product problem - runs 1&4.
- Run 1 - CPU costs as a % of highest vendor
- Run 4 - CPU costs as a % of highest vendor
- Sample display of actual coding - Run 4



# SAMPLE OUTPUT

## NEW PRODUCT MODEL

<u>RUN 1</u>	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>YEAR 3</u>	<u>YEAR 4</u>
UNITS SOLD	50000	57500	66125	76044
SELLING PRICE	<u>8.50</u>	<u>9.00</u>	<u>9.50</u>	<u>10.00</u>
REVENUE	425000	517500	628187	760436
RAW MATERIAL	150000	184575	229242	279445
DIRECT LABOR	100000	123050	152828	186297
PACKAGING	25000	30762	38207	46574
DISTRIBUTION	<u>37500</u>	<u>46144</u>	<u>57310</u>	<u>69861</u>
GROSS PROFITS	112500	132969	150600	178259
FIXED COSTS	<u>40000</u>	<u>40000</u>	<u>40000</u>	<u>40000</u>
NET BEFORE TAXES	72500	92969	110600	138259
TAXES PAYABLE	15950	20453	24332	30417

NET INCOME	56550	72516	86268	107842
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### RUN 4      -10.00 % SENSITIVITY ON UNITS SOLD

	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>YEAR 3</u>	<u>YEAR 4</u>
UNITS SOLD	45,000	51,750	59,510	68,440
REVENUE	382,500	465,750	565,370	684,390
GROSS PROFITS	101,250	119,670	135,540	160,430
NET BEFORE TAXES	61,250	79,670	95,540	120,430
NET INCOME	47,770	62,140	74,520	93,940

### -5.00 % SENSITIVITY ON UNITS SOLD

	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>YEAR 3</u>	<u>YEAR 4</u>
UNITS SOLD	47,500	54,620	62,820	72,240
REVENUE	403,750	491,620	596,780	722,410
GROSS PROFITS	106,870	126,320	143,070	169,350
NET BEFORE TAXES	66,870	86,320	103,070	129,350
NET INCOME	52,160	67,330	80,390	100,890

### .00 % SENSITIVITY ON UNITS SOLD

	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>YEAR 3</u>	<u>YEAR 4</u>
UNITS SOLD	50,000	57,500	66,120	76,040
REVENUE	425,000	517,500	628,190	760,440
GROSS PROFITS	112,500	132,970	150,600	178,260
NET BEFORE TAXES	72,500	92,970	110,600	138,260
NET INCOME	56,550	72,520	86,270	107,840

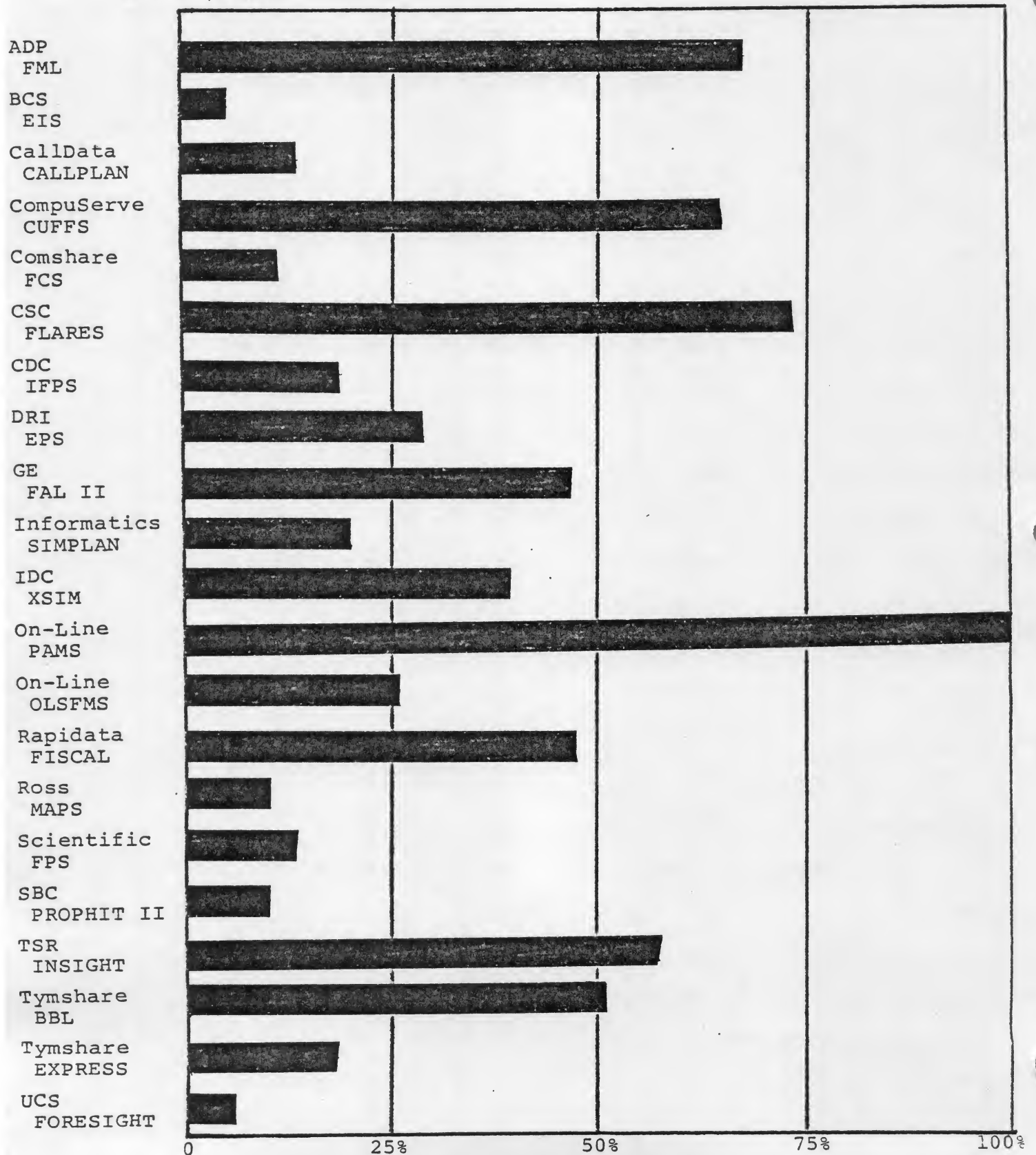
# CPU COSTS FOR NEW PRODUCT

PROBLEM - RUNS 1 & 4

VENDOR	PACKAGE	CPU COSTS		CPU COSTS	
		RUN 1	% OF HIGHEST	RUN 4	% OF HIGHEST
ADP Network Services	FML	\$ 6.96	68%	\$ .92	5%
Boeing Computer Ser.	EIS	.54	5%	.99	6%
CallData Systems	CALLPLAN	1.42	14%	3.67	21%
CompuServe	CUFFS	7.02	68%	8.52	49%
Comshare	FCS	1.12	11%	.91	5%
Computer Sciences	FLARES	7.60	79%	5.53	31%
Control Data	IFPS	1.92	19%	1.63	9%
Data Resources	EPS	3.00	29%	3.45	20%
General Electric	FAL II	3.82	37%	7.36	42%
Informatics	SIMPLAN	2.05	20%	3.21	18%
Interactive Data	XSIM	4.06	39%	5.65	32%
On-Line Systems	PAMS	10.30	100%	6.50	37%
On-Line Systems	OLSFMS	2.65	26%	4.40	25%
Rapidata	FISCAL	4.68	45%	9.66	55%
Ross Systems	MAPS	1.04	10%	1.33	8%
Scientific TS	FPS	1.39	13%	3.09	18%
Service Bureau	PROPHIT II	1.08	10%	3.60	21%
Time Sharing Resources	INSIGHT	5.85	57%	17.44	100%
Tymshare	BBL	5.20	50%	1.70	10%
Tymshare	EXPRESS	1.82	18%	3.29	19%
United Computing	FORESIGHT	.53	5%	1.56	9%

# RUN 1 - CPU COSTS AS A % OF HIGHEST VENDOR

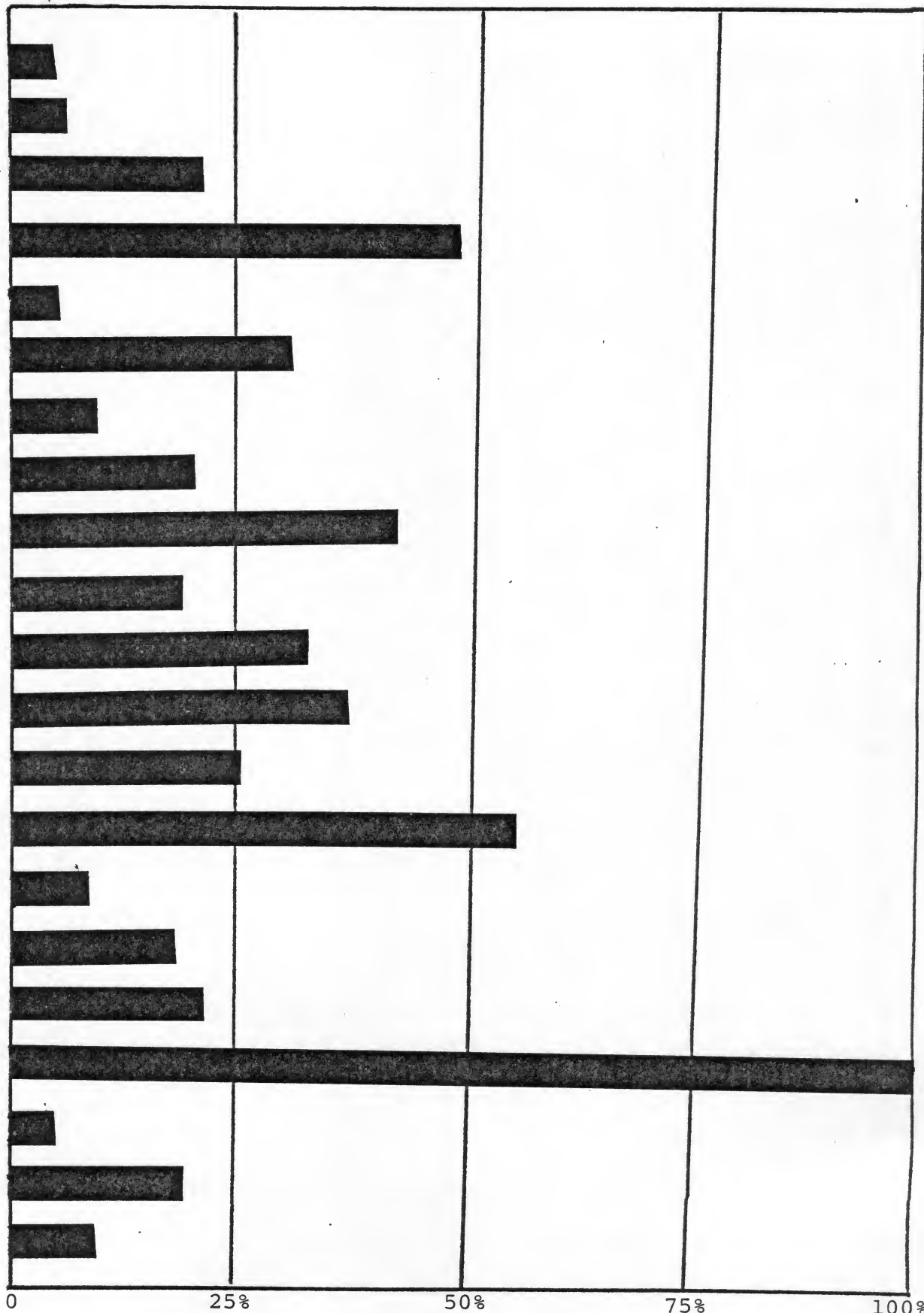
100% = \$10.30



# RUN 4 - CPU COSTS AS A % OF HIGHEST VENDOR

100% = \$17.44

ADP  
FML  
BCS  
EIS  
CallData  
CALLPLAN  
CompuServe  
CUFFS  
Comshare  
FCS  
CSC  
FLARES  
CDC  
IFPS  
DRI  
EPS  
GE  
FAL II  
Informatics  
SIMPLAN  
IDC  
XSIM  
On-Line  
PAMS  
On-Line  
OLSFMS  
Rapidata  
FISCAL  
Ross  
MAPS  
Scientific  
FPS  
SBC  
PROPHIT II  
TSR  
INSIGHT  
Tymshare  
BBL  
Tymshare  
EXPRESS  
UCS  
FORESIGHT



# SAMPLE DISPLAY OF ACTUAL CODING - RUN 4

## ADP Network Services - FML

\*DATA

ENTER NAMES AND VALUES, SEPARATED BY COMMAS

WHEN FINISHED, TYPE "END"

?PRICEFACT 0\*

UNIT FACT -.1\*

?END

\*DATA

ENTER NAMES AND VALUES, SEPARATED BY COMMAS

WHEN FINISHED, TYPE "END"

UNIT FACT -.05\*

?END

## Boeing Computer Services - EIS

INPUT INFL 1 1.07 1.08 1.06:

INPUT RAWM 3 0 0 0:

INPUT LABR 2 0 0 0:

INPUT PACK .5 0 0 0:

INPUT DIST .75 0 0 0:

INPUT PWR 0 1 2 3:

INPUT UNIT 4\*50000:

INPUT SELL 8.5 9 9.5 10:

COMPUTE FACT=10\*\*CUM(LOG(INFL));VCST=FACT\*CUM((RAWM+LABR+PACK+DIST)/FACT):

COMPUTE UNIT=UNIT\*(1.15\*\*PWR);USL1=UNIT\*.9;REV1=USL1\*SELL:

INPUT FIX 4\*40000:

COMPUTE GRS1=REV1-USL1\*VCST;NET1=GRS1-FIX;TPAY=NET1\*.22;NTI1=NET1-TPAY:

COMPUTE USL2=UNIT\*.95;REV2=USL2\*SELL:

COMPUTE GRS2=REV2-USL2\*VCST;NET2=GRS2-FIX;TPAY=NET2\*.22;NTI2=NET2-TPAY:

COMPUTE USL3=UNIT;REV3=USL3\*SELL:

COMPUTE GRS3=REV3-VCST\*USL3;NET3=GRS3-FIX;TPAY=NET3\*.22;NTI3=NET3-TPAY:

COMPUTE USL4=UNIT\*1.05;REV4=USL4\*SELL:

COMPUTE GRS4=REV4-VCST\*USL4;NET4=GRS4-FIX;TPAY=NET4\*.22;NTI4=NET4-TPAY:

ROUND -1:

COMPUTE USL1=USL1-.1;REV1=REV1-.1;GRS1=GRS1-.1;NET1=NET1-.1;NTI1=NTI1-.1:

COMPUTE USL2=USL2-.1;REV2=REV2-.1;GRS2=GRS2-.1;NET2=NET2-.1;NTI2=NTI2-.1:

COMPUTE USL3=USL3-.1;REV3=REV3-.1;GRS3=GRS3-.1;NET3=NET3-.1;NTI3=NTI3-.1:

COMPUTE USL4=USL4-.1;REV4=REV4-.1;GRS4=GRS4-.1;NET4=NET4-.1;NTI4=NTI4-.1:

ROUND OFF:

FORM A4:

CallData Systems - CALLPLAN

P:.TYPE 610

610 SUPPRESS INFLATION RAW.MAT THRU DISTRIB FIX.COST TAX.PAY

P:.615 SUPPRESS PRICE

```
70 "-10.00 % SENSITIVITY ON UNITS SOLD"
WHAT-IF UNITS=UNITS*.90
RULES
DISPLAY
REMOVE
70 "-5.00 % SENSITIVITY ON UNITS SOLD"
WHAT-IF UNITS=UNITS*.95
RULES
DISPLAY
REMOVE
70 "0.00 % SENSITIVITY ON UNITS SOLD"
RULES
DISPLAY
REMOVE
70 "+5.00 % SENSITIVITY ON UNITS SOLD"
WHAT-IF UNITS=UNITS*1.05
RULES
DISPLAY
$PRINT "** SENSITIVITY ANALYSIS COMPLETE **"
```

---

Compuserve - CUFFS

```
----- CHANGE.DATA(#400); SMALL REPORT; RERUN(3)

#400 SENSITIVITY ON UNITS SOLD (HIST&FUT)  = -10%
#400 SENSITIVITY ON UNITS SOLD (HIST&FUT)  = -5%
#400 SENSITIVITY ON UNITS SOLD (HIST&FUT)  = 0
#400 SENSITIVITY ON UNITS SOLD (HIST&FUT)  = 5%
```

---

Computer Sciences - FLARES

```
!edit mod01 modr4
^33* unitfact=-10,-5,0,5
^35*
^56.1* left unitfact =',unitfact
^57* show units,revnu,grossprof,netbet,netinc
^q
```



Comshare - FCS

COMMAND:SS -  
STEP SENSITIVITY  
FST PERIOD,LST PERIOD?1,4  
ROW NUMBER,FROM%,TO %,STEPS %?5,-10,5,5  
ROW NOS. TO DISPLAY?5,7,20,30,37

---

Control Data - IFPS

WHAT IF CASE 3, ENTER STATEMENTS  
? UNITS SOLD=UNITS SOLD- $(.1 * \text{UNITS SOLD})$ ,PREVIOUS\*1.15  
  
ENTER SOLVE OPTIONS  
? L2,L4,L9,L11,L13  
  
WHAT IF CASE 4, ENTER STATEMENTS  
? UNITS SOLD=UNITS SOLD- $(.05 * \text{UNITS SOLD})$ ,PREVIOUS\*1.15

---

Data Resources - EPS

1850 ...  
1855 ...QUESTION 3  
1860 SET VERSION = BASIC  
1870 EDIT NEWPRODSHORT AS NEWPRODSHORTER  
1880 DEL 6  
1890 SET VERSION = SALESDOWN10% OF BASIC  
1900 SALES = .90 \* SALES  
1901 DO REGENERATE  
1910 SET VERSION = SALESDOWN5% OF BASIC  
1920 SALES = .95 \* SALES  
1921 DO REGENERATE  
1930 SET VERSION = SALESDOWN0% OF BASIC  
1940 SET VERSION = SALESUP5% OF BASIC  
1950 SALES = 1.05 \* SALES  
1951 DO REGENERATE  
1955 ...STACK sets an option value while remembering the previous  
1956 ... setting.  
1957 ...Semicolons and ampersands link commands into a  
1958 ... compound command.  
1960 WRITE <VERSION = SALESDOWN10%> WITH YEARS, NEWPRODSHORTER;&&  
1970 STACK PAGEHEAD = "";&&  
1980 WRITE <VERSION = SALESDOWN5%> WITH YEARS, NEWPRODSHORTER;&&  
1990 WRITE <VERSION = SALESDOWN0%> WITH YEARS, NEWPRODSHORTER;&&  
2000 WRITE <VERSION = SALESUP5%> WITH YEARS, NEWPRODSHORTER  
2005 ...REVERT sets an option back to the previously STACKed value  
2010 REVERT PAGEHEAD  
2020 PRINT&STARTCLOCK <PROGRESS=#LOWPRINTER> 1

General Electric - FAL II

MODIFY ROW 505 COL 2 TO -0.10  
SET ROW 505 COL 2 TO -0.05  
SET ROW 505 COL 2 TO 0.0  
SET ROW 505 COL 2 TO 0.05

---

Informatica - SIMPLAN

ANALYSIS.  
.enter 1 usold

USOLD ( 3) ( 1- 1):  
.45000

ANALYSIS.  
.solve reald1

ENTER "END" OR SPECIFY WHAT IS TO BE PRINTED  
.usold rev sprof nbt neti

ANALYSIS  
.enter 1 usold

USOLD ( 3) ( 1- 1):  
.47500

ANALYSIS.  
.solve reald1

ENTER "END" OR SPECIFY WHAT IS TO BE PRINTED.  
.usold rev sprof nbt neti

Interactive Data - XSIM

DRIVER3 -

DO ORIGINAL UNITS = UNITS;  
& SENSREP -10  
& SENSREP -5  
& SENSREP 0

SENSREP -

DO UNITS = ORIGINAL\_UNITS \* (1 + 81 "PERCENT CHANGE")/100:

& RUN MOD;

GENREP COMMA

TITLE<81% SENSITIVITY ON UNITS SOLD>

REP14 -

ROWTITLE<QUESTION 3>  
UNITS<UNITS SOLD>  
REVENUE<REVENUE>  
GROSPROF<GROSS PROFITS>  
NETPROF<NET BEFORE TAXES>  
NETINC<NET INCOME>

'77 TO 80;

---

On-Line Systems - PAMS

/\*A N

\*\*@ 10 -10

/\*A N

\*\*+ 10 5

On-Line Systems - OLSFMS

\$ TYPE REPORT 103

00100 MAR;  
00110 WID 62  
00120 DEP -20  
00130 MON  
00140 ACC 0  
00150 ;  
00160 CEN  
00170 TIT;  
00180 TIT ., % SENSITIVITY ON UNITS SOLD  
00190 BLA  
00200 ;  
00210 ALI  
00220 HEA; YEAR 1, YEAR 2, YEAR 3, YEAR 4  
00230 SCO  
00240 ;  
00250 PRI #, UNITS, REVEN, GROSS, NET, INCOM  
00260 ;  
00270 END

\$ RUN WITH ZUNIT=-10.0  
EXECUTING MODEL 100  
\$ USE TITLE -10.00  
\$ P REP 103

\$ RUN WITH ZUNIT=-5.0  
EXECUTING MODEL 100  
\$ USE TITLE -5.00  
\$ P REP 103

---

Rapidata - FISCAL

0090 MODIFY\* 1010 1 4\*-.1  
0100 PRI CR ACC 1010 1030 2020 2040 2060  
0110 NEXT  
0120 MODIFY\* 1010 1 4\*-.05  
0130 PRI CR ACC 1010 1030 2020 2040 2060  
0140 NEXT  
0150 PRI CR ACC 1010 1030 2020 2040 2060  
0160 NEXT  
0170 MODIFY\* 1010 1 4\*.05  
0180 PRI CR ACC 1010 1030 2020 2040 2060

Ross Systems - MAPS

ENTER VALUE FOR PCT INCREASE IN UNITS  
? -.1  
ENTER VALUE FOR PCT INCREASE IN PRICE  
? 0  
ENTER VALUE FOR 0=DETAIL, 1=SUMMARY  
? 1

ENTER VALUE FOR PCT INCREASE IN UNITS  
? -.05  
ENTER VALUE FOR PCT INCREASE IN PRICE  
? 0  
ENTER VALUE FOR 0=DETAIL, 1=SUMMARY  
? 1

---

Scientific Time Sharing - FPS

SENSITIVITY SESSION SETUP

DATABASE 3384725 NEWPRD

SENSITIVITY SESSION NO. 1 SAVED 9/22/77 AT 15:03  
NUMBER OF ITERATIONS = 4  
MINIREPORT TO USE = 0

\*\*\*\*\*MODEL ELEMENTS VARIED\*\*\*\*\*

\*\*YDS 1 VAR TYPE = MUL PRINT DATA = 12 N  
INITIAL VALUE 50000 57500 66125 76044  
MUL FACTORS 1 0.9 0.95 1.05

Scientific Time Sharing - FPS (Continued)

SENSE MODEL

```

V NEWPRCD3
[1]  +SEGMENT 1
[2]  UNITS+[YDS 1
[3]  INFLATION+CUMPROD YDS 3 R INFLATION FACTOR
[4]  1 EQ UNITS
[5]  2 EQ YDS 2 R PRICES
[6]  3 EQ UNITS×L 2 R REVENUE
[7]  4 5 6 7 MEQ(P 3 4 5 6) MPROD UNITS×INFLATION
[8]  8 EQ(L 3)-SUM 4 5 6 7
[9]  9 EQ YDS 4
[10] 10 EQ(L 8)-L 9 R NET INCOME BEFORE TAXES
[11] 11 EQ 0.22×L 10 R TAX AMOUNT
[12] 12 EQ(L 10)-L 11 R NET INCOME AFTER TAXES
[13] SNAPSHOT
[14] +END

```

V

SENSE REPORT

```

V SNAPSHOT
[1] 1 2 3 4 QUICK 1 2 3 8 10 12
V

```

---

Service Bureau - PROPHIT II

COMMAND? WWHAT-IF  
WHAT-IF DEFINITION FILE? (T)  
REPORT INFILE,OUTFILE? NPPREP,UNIT1  
UNIT1 DOES NOT EXIST BUT IS NOW BEING CREATED  
LINE? 1000  
TYPE,FIRST, LAST COLUMN? PER,1,4

PERCENT ADDED? -10  
LINE? 0  
REPORT FILE UNIT 1COMPLETED .

COLUMNS? ALL  
TOTAL COLUMNS? NO  
LINES? SEL  
LINES; AFTER LAST 0\*  
? \$1000,1100,1300,1400,1500,0



Time Sharing Resources - INSIGHT

ACTION: \*\*START  
\* STARTING AT STEP 1 \*  
ACTION: ID  
ENTER FILE ID: FWORK  
INPUT LINES, COLUMNS OR PARAMETERS [LCP]? P  
\* ENTER PARAMETER ID; VALUE. END WHEN COMPLETE \*  
ENTER: \*\*  
\* STOPPING AT STEP 3 \*  
ENTER: 1 2; \*10 0  
ENTER: \*\*FINISH  
\* STARTING AT STEP 1 \*  
ENTER: X

ACTION: PR  
ENTER REPORT ID: NEWQ3  
ENTER FILE ID: FWORK  
OUTPUT HERE, TSR OR FILE [HTF]? \*\*  
\* STOPPING AT STEP 4 \*  
OUTPUT HERE, TSR OR FILE [HTF]? F  
FILE NAME SELECTED: INS

ACTION: \*START  
ENTER: 1; \*5  
ENTER: \*FINISH  
OUTPUT HERE, TSR OR FILE [HTF]? F  
FILE NAME SELECTED: INS

ACTION: \*START  
ENTER: 1; 0  
ENTER: \*FINISH  
OUTPUT HERE, TSR OR FILE [HTF]? F  
FILE NAME SELECTED: INS

ACTION: \*START  
ENTER: 1; 5  
ENTER: \*FINISH  
OUTPUT HERE, TSR OR FILE [HTF]? F  
FILE NAME SELECTED: INS

ACTION: )PRINT INS

---

Tymshare - BBL

-TYPE WHAT2.DAT  
QUESTION 3  
.9,1.05,.05  
1,1,1

Tymshare - EXPRESS

RELEASE UNITS  
SET UNITS UNITS\*.9  
TBL LINEVAR

RELEASE UNITS  
SET UNITS UNITS\*.95  
TBL

---

United Computing Systems - FORESIGHT

00010 TERM = 5  
00030 HIS  
00040 MODELA  
00045 DATA 'RUN-4'  
00050 L 101.1 '-----'  
00120 L 109.5 '\*TEMP1' = 43478.26, L109.5() \* 1.15 + .5,TR  
00130 L 109.7 '\*SENSITIVITY' = .9  
00135 CH L 100 ' -10 PCT'  
00140 CH L 110 = L 109.5 \* L109.7  
00160 CALC  
00165 PR L 101.1  
00170 PR L 100 110 150 230 260 290  
00190 CH L 100 ' -5 PCT '  
00200 CH L 109.7 = .95  
00210 CALC  
00215 PR L 101.1  
00220 PR L 100 110 150 230 260 290  
00225 CH L 100 '100 PCT UNITS'  
00230 CH L 109.7 = 1.0  
00235 PR L 101.1  
00240 CALC  
00250 PR L 100 110 150 230 260 290  
00255 CH L 100 '105 PCT UNITS'  
00260 CH L 109.7 = 1.05  
00270 CALC  
00275 PR L 101.1  
00280 PR L 100 110 150 230 260 290  
00285 PR L 101.1  
\*RDY\*

## SUMMARY

The full report contains an extensive analysis of all seven benchmark problems. In addition to the type of information found in the New Product problem extract, RDC presents a commentary of each system with respect to:

- relative costs
- ease of use
- completeness
- documentation
- storage & connect charges
- special analyses

There are two other sections of the report. The Vendors and Product Information section of the report presents the vendors' responses to the RDC questionnaires. The results of these questionnaires have been compiled in order for the user to get answers to specific questions on the overall capabilities of the companies and the specific products involved in the report.

The purpose of RDC's published report was to provide the users with an understanding of the alternatives available for computerized financial reporting and modeling systems. It is our hope that this extract provides an understanding of how we approached this difficult and complex problem. Interested parties may purchase the 329 page report A Comparative Analysis of Financial Reporting and Modeling Systems - Second Edition, for \$695.00 plus postage, handling, and applicable sales tax by sending a letter or purchase order to:

REAL DECISIONS CORPORATION  
870 High Ridge Road  
Stamford, Connecticut 06905  
(203) 329-2071



AN EXTRACT FROM  
**A COMPARATIVE ANALYSIS  
OF FINANCIAL REPORTING AND MODELING SYSTEMS**

May, 1978

**PREPARED BY:** Real Decisions Corporation, 870 High Ridge Road, Stanford, CT 06905, 203/329-2071.

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**NOTE:** AT&S's distribution of this extract is solely for the information and independent evaluation by its members, and does not in any way constitute verification of the data contained, concurrence with any of the conclusions herein, or endorsement of the products or services of the vendors mentioned. The vendors included in this extract were chosen solely by RDC, and although AT&S was consulted for advice, the Association was not involved in any way in the preparation of their copyrighted comparative analysis.

## PREFACE

This Extract has been taken from the Second Edition of the report entitled A Comparative Analysis of Financial Reporting and Modeling Systems published by Real Decisions Corporation in November, 1977. RDC has used its best efforts to ensure the accuracy of the information contained herein. The processes described in this Extract should be viewed as only one factor in evaluating any given vendor's capabilities. Vendors and systems included in this Extract are:

<u>Vendor Name</u>	<u>Location</u>	<u>System Name</u>
ADP Network Services	Ann Arbor, MI	FML
*Boeing Computer Services	Morristown, NJ	EIS
*CallData Systems	Woodbury, NY	CALLPLAN
CompuServe	Columbus, OH	CUFFS
*Computer Sciences	El Segundo, CA	FLARES
Comshare	Ann Arbor, MI	FCS
Control Data	Minneapolis, MN	IFPS
Data Resources	Lexington, MA	EPS
General Electric	Rockville, MD	FAL II
Informatics	Fairfield, NJ	SIMPLAN
Interactive Data	Waltham, MA	XSIM
National CSS	Norwalk, CT	EMS
On-Line Systems	Pittsburgh, PA	OLSFMS, PAMS
Rapidata	Fairfield, NJ	FISCAL
*Ross Systems	Palo Alto, CA	MAPS
Scientific Time Sharing	Bethesda, MD	FPS
Service Bureau	Greenwich, CT	PROPHIT II
*Time Sharing Resources	Great Neck, NY	INSIGHT
Tymshare	Cupertino, CA	BBL, EXPRESS
United Computing Systems	Kansas City, MO	FORESIGHT

\*These vendors and systems do not appear in the first edition of A Comparative Analysis of Financial Reporting and Modeling Systems published in April, 1977.

## INTRODUCTION

There has been an increasing movement by users of Remote Computer Services (RCS) towards the use of various application packages. One of the application areas growing most rapidly is that of financial systems. As a consulting firm, Real Decisions Corporation (RDC) recognized the necessity for RCS users to understand the alternatives available in this field. For this reason, RDC developed its first published report on application packages--A Comparative Analysis of Financial Reporting and Modeling Systems--so that it will assist users in evaluating such packages, including comparison of costs.

A financial system package has many aspects that a user should consider in his evaluation. For instance, a user should examine his need and determine whether he requires the ability to interface with other data bases or statistical packages. He should also be concerned with the quality of documentation and technical assistance offered with his financial reporting and modeling system, as well as any special features which are peculiar to his problems. Although these and many other things are important in his decision, a user must first determine the exact type of reporting and modeling he will be doing. Once these requirements are defined, the user can investigate the financial systems offered by vendors. These range from the more limited "fixed" packages to the more powerful and flexible "high-level" languages. The user should select a package that will meet his needs and fulfill his ease of use requirements. This is where the Benchmark Problems and Analysis section of the RDC report will be most valuable. It not only deals with different application problems and their cost comparisons, but gives the user a flavor of how easy or difficult the system is to use and whether it conforms to his standards.



The Benchmark Problems and Analysis section of the report deals with seven common user applications:

- New Product Planning
- Consolidations of Financial Results
- Cash Flow Projections
- Project Financing
- Long Range Plan
- Sales Driven Model
- Econometric Exercise

This set of problems was assembled by RDC with the invaluable assistance of two members of ATSU and other individuals with particular expertise in financial modeling systems. RDC ran the benchmarks on four different systems to fine tune the models and the approach prior to sending the problems to the vendors. The vendors were asked to code and run the problems on their systems in order to insure an accurate representation of them.

This extract will deal with portions of the New Product Planning problem. The problem concerns an evaluation of the profitability of a new product over the next four years. As can be seen by the complete statement of the problem on the following pages, the model is simple and straight forward. The vendors were asked to show how the data and logic files were read-in and displayed, how a formal report may be printed, and finally show how to perform sensitivity analyses. The costs in the CPU Cost Comparison Chart are expressed as their real values and as a percentage of the highest vendor. These percentages are highlighted in the subsequent bar charts for runs 1 and 4. Also included is a sample display of the actual coding used by the sixteen systems in the comparative analysis to solve the sensitivity analysis question (run 4). The sample code should show the user the general style of each system. The extract concludes with a summary that discusses the other features of the full report.

The following vendors/systems reported significant changes since the first edition of the report:

- CompuServe/CUFFS - Costs were reduced through a combination of a redesign of the models for more efficient operation, and a change in the pricing algorithm.
- Control Data/IFPS - Models were rewritten and rerun, reflecting some changes in both efficiency and readability.
- Data Resources/EPS - Models were rerun, reflecting hardware and software changes over the period.
- General Electric/FAL II - General price increase is reflected in the CPU costs.
- Interactive Data/XSIM - General price increase is reflected in the CPU costs.
- On-Line Systems/PAMS - Models were redesigned and software was modified, reflecting substantially lower costs.
- Rapidata/FISCAL - More detail costs were made available, and a general price increase is reflected in the CPU costs.
- Scientific TS/FPS - Redesign of models to operate under new version of software caused significant cost reduction.
- Tymshare/EXPRESS - Complete redesign and rerun of models reduced costs substantially.

## NEW PRODUCT PROBLEM

As an example from the full report, portions of the New Product Planning problem are exhibited here. The basic model is set up to evaluate the profitability of a new product over the next four years. The model is simple and the code necessary to run part of the model is included on this problem to show the user the general style of each system. In addition, the use of "What-If" analysis is featured with both selected and complete print out of the model.

The New Product Planning problem is described as follows:

Marketing Research is evaluating the profitability of a new product over the next four years.

Units sold are anticipated to be 50,000 increasing by 15% per year. The selling price of \$8.50 increased \$0.05 per year after the initial year.

Variable costs per unit included in the cost of goods sold are as follows:

1. Raw Materials = \$3.00
2. Direct Labor = \$2.00
3. Packaging = \$0.50
4. Distribution = \$0.75

Inflation over the next three years is expected to be 7%, 8%, and 6%. Fixed costs involved in releasing the product fall into two categories:

1. Factory = \$25,000
2. Other = \$15,000

Administration feels that these costs can be held constant over the four years, even in the face of inflation. The effective tax rate is 22%.

The vendors were required to show how the data and logic files are read-in and displayed and how a formal report is printed on each system. Also requested were several sensitivity analyses to be done with complete and partial print outs. Individual CPU Costs were taken for each "run" and exhibited in comparative charts. This extract is concerned with runs 1 and 4. Run 1 involves coding and solving the complete problem with the entire model being printed out in a formal report. Run 4 is a "What-If" type question which shows the effect of changing the number of units sold over a range from -10% to 5% (stepped sensitivity). Instead of displaying the entire model as in Run 1, though, Run 4 requires only selected rows to be printed out. The specific information included on the following pages is:

- CPU costs for new product problem - runs 1&4.
- Run 1 - CPU costs as a % of highest vendor
- Run 4 - CPU costs as a % of highest vendor
- Sample display of actual coding - Run 4

SAMPLE OUTPUT

NEW PRODUCT MODEL

<u>RUN 1</u>	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>YEAR 3</u>	<u>YEAR 4</u>
UNITS SOLD	50000	57500	66125	76044
SELLING PRICE	<u>8.50</u>	<u>9.00</u>	<u>9.50</u>	<u>10.00</u>
REVENUE	425000	517500	628187	760436
RAW MATERIAL	150000	184575	229242	279445
DIRECT LABOR	100000	123050	152828	186297
PACKAGING	25000	30762	38207	46574
DISTRIBUTION	<u>37500</u>	<u>46144</u>	<u>57310</u>	<u>69861</u>
GROSS PROFITS	112500	132969	150600	178259
FIXED COSTS	<u>40000</u>	<u>40000</u>	<u>40000</u>	<u>40000</u>
NET BEFORE TAXES	72500	92969	110600	138259
TAXES PAYABLE	15950	20453	24332	30417
-----				
NET INCOME	56550	72516	86268	107842
-----				

RUN 4

-10.00 % SENSITIVITY ON UNITS SOLD

	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>YEAR 3</u>	<u>YEAR 4</u>
UNITS SOLD	45,000	51,750	59,510	68,440
REVENUE	382,500	465,750	565,370	684,390
GROSS PROFITS	101,250	119,670	135,540	160,430
NET BEFORE TAXES	61,250	79,670	95,540	120,430
NET INCOME	47,770	62,140	74,520	93,940

-5.00 % SENSITIVITY ON UNITS SOLD

	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>YEAR 3</u>	<u>YEAR 4</u>
UNITS SOLD	47,500	54,620	62,820	72,240
REVENUE	403,750	491,620	596,780	722,410
GROSS PROFITS	106,870	126,320	143,070	169,350
NET BEFORE TAXES	66,870	86,320	103,070	129,350
NET INCOME	52,160	67,330	80,390	100,890

.00 % SENSITIVITY ON UNITS SOLD

	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>YEAR 3</u>	<u>YEAR 4</u>
UNITS SOLD	50,000	57,500	66,120	76,040
REVENUE	425,000	517,500	628,190	760,440
GROSS PROFITS	112,500	132,970	150,600	178,260
NET BEFORE TAXES	72,500	92,970	110,600	138,260
NET INCOME	56,550	72,520	86,270	107,840

## CPU COSTS FOR NEW PRODUCT

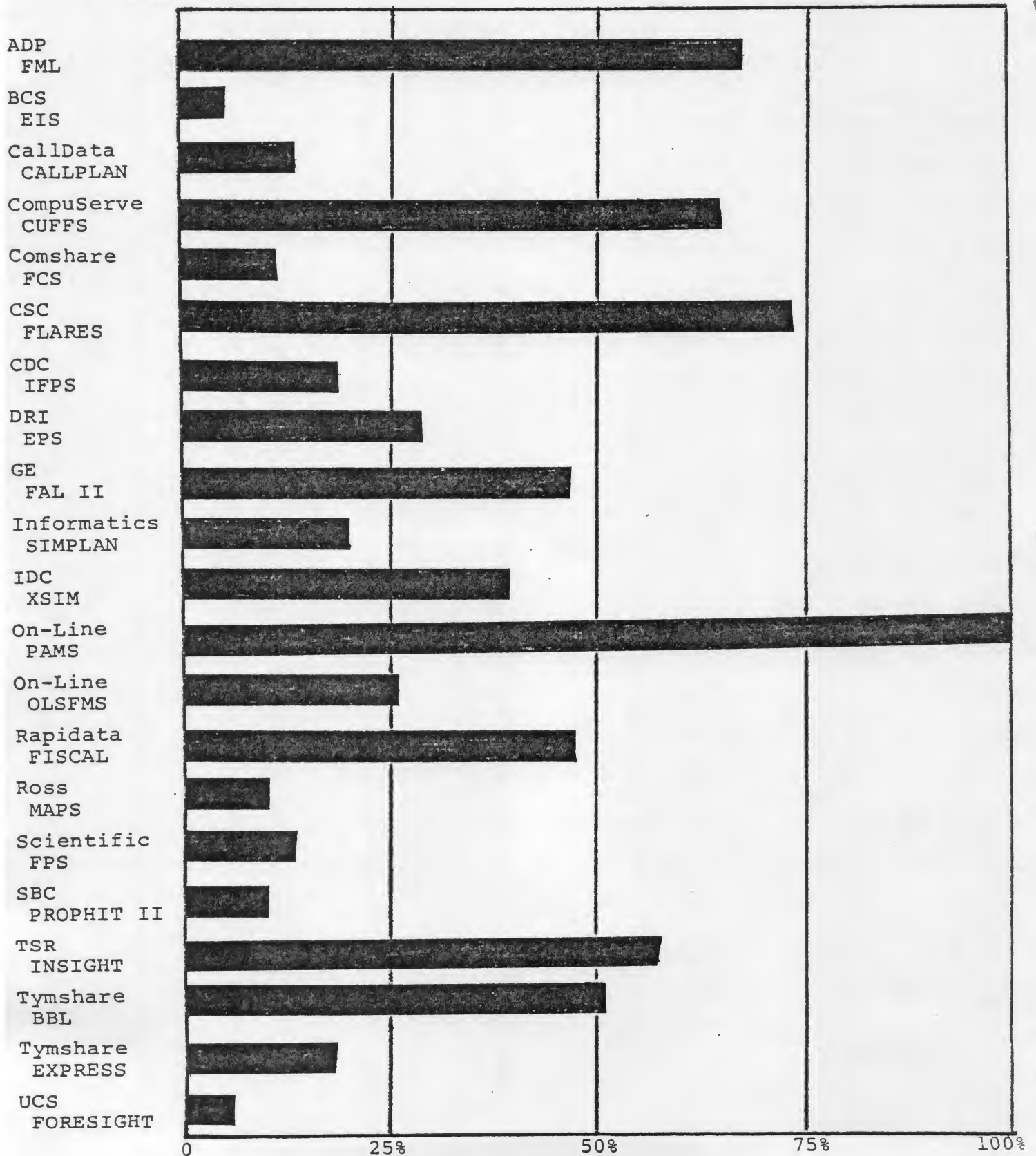
PROBLEM - RUNS 1 &amp; 4

VENDOR	PACKAGE	CPU COSTS		CPU COSTS	
		RUN 1	% OF HIGHEST	RUN 4	% OF HIGHEST
ADP Network Services	FML	\$ 6.96	68%	\$ .92	5%
Boeing Computer Ser.	EIS	.54	5%	.99	6%
CallData Systems	CALLPLAN	1.42	14%	3.67	21%
CompuServe	CUFFS	7.02	68%	8.52	49%
Comshare	FCS	1.12	11%	.91	5%
Computer Sciences	FLARES	7.60	79%	5.53	31%
Control Data	IFPS	1.92	19%	1.63	9%
Data Resources	EPS	3.00	29%	3.45	20%
General Electric	FAL II	3.82	37%	7.36	42%
Informatics	SIMPLAN	2.05	20%	3.21	18%
Interactive Data	XSIM	4.06	39%	5.65	32%
On-Line Systems	PAMS	10.30	100%	6.50	37%
On-Line Systems	OLSFMS	2.65	26%	4.40	25%
Rapidata	FISCAL	4.68	45%	9.66	55%
Ross Systems	MAPS	1.04	10%	1.33	8%
Scientific TS	FPS	1.39	13%	3.09	18%
Service Bureau	PROPHIT II	1.08	10%	3.60	21%
Time Sharing Resources	INSIGHT	5.85	57%	17.44	100%
Tymshare	BBL	5.20	50%	1.70	10%
Tymshare	EXPRESS	1.82	18%	3.29	19%
United Computing	FORESIGHT	.53	5%	1.56	9%



# RUN 1 - CPU COSTS AS A % OF HIGHEST VENDOR

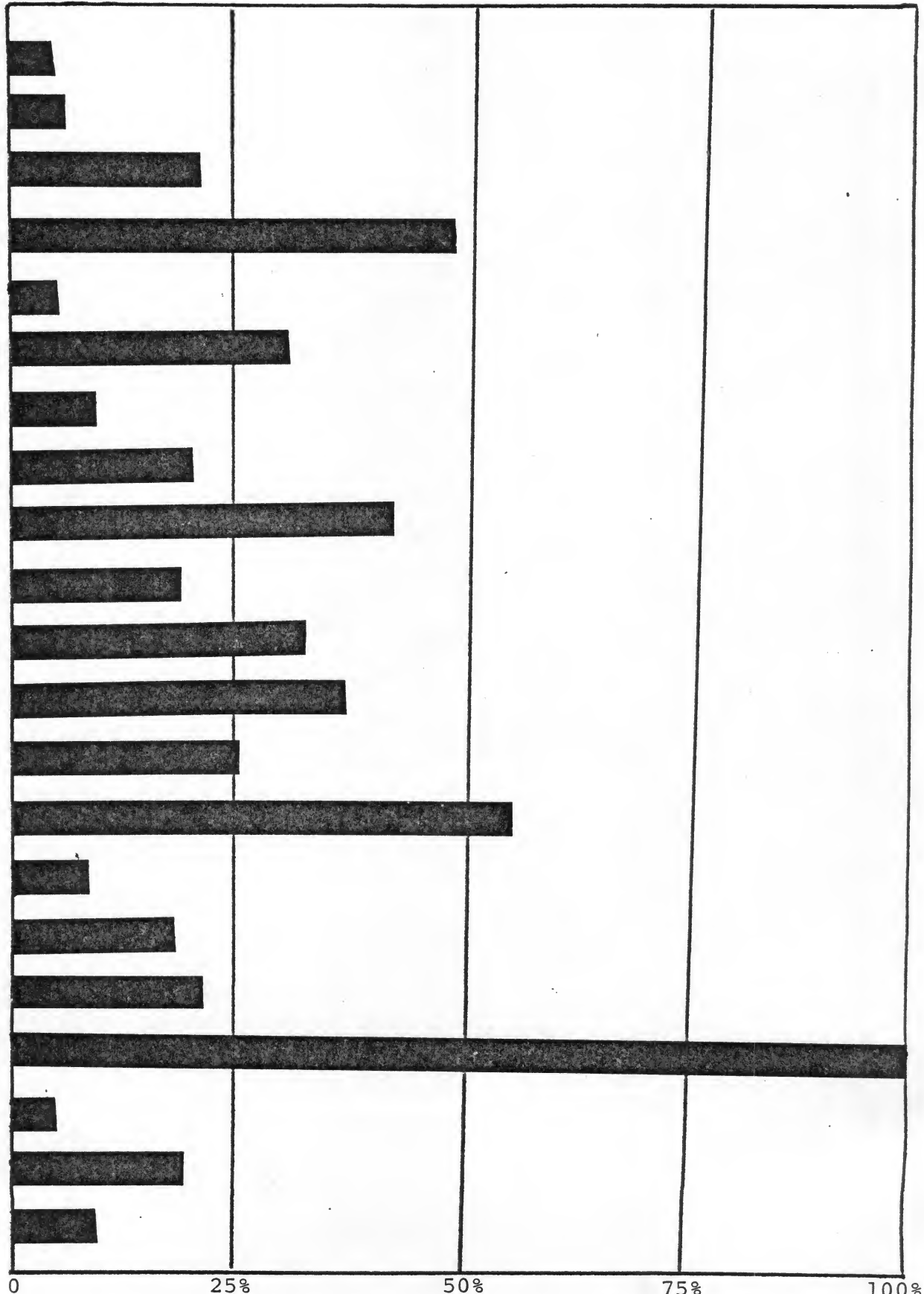
100% = \$10.30



# RUN 4 - CPU COSTS AS A % OF HIGHEST VENDOR

100% = \$17.44

ADP  
FML  
BCS  
EIS  
CallData  
CALLPLAN  
CompuServe  
CUFFS  
Comshare  
FCS  
CSC  
FLARES  
CDC  
IFPS  
DRI  
EPS  
GE  
FAL II  
Informatics  
SIMPLAN  
IDC  
XSIM  
On-Line  
PAMS  
On-Line  
OLSFMS  
Rapidata  
FISCAL  
Ross  
MAPS  
Scientific  
FPS  
SBC  
PROPHIT II  
TSR  
INSIGHT  
Tymshare  
BBL  
Tymshare  
EXPRESS  
UCS  
FORESIGHT



# SAMPLE DISPLAY OF ACTUAL CODING - RUN 4

## ADP Network Services - FML

\*DATA

ENTER NAMES AND VALUES, SEPARATED BY COMMAS  
WHEN FINISHED, TYPE "END"

?PRICEFACT 0\*

UNIT FACT -.1\*

?END

\*DATA

ENTER NAMES AND VALUES, SEPARATED BY COMMAS  
WHEN FINISHED, TYPE "END"

UNIT FACT -.05\*

?END

## Boeing Computer Services - EIS

```

INPUT INFL 1 1.07 1.08 1.06:
INPUT RAWM 3 0 0 0:
INPUT LABR 2 0 0 0:
INPUT PACK .5 0 0 0:
INPUT DIST .75 0 0 0:
INPUT PWR 0 1 2 3:
INPUT UNIT 4*50000:
INPUT SELL 8.5 9 9.5 10:
COMPUTE FACT=10**CUM(LOG(INFL));VCST=FACT*CUM((RAWM+LABR+PACK+DIST)/FACT):
COMPUTE UNIT=UNIT*(1.15**PWR);USL1=UNIT*.9;REV1=USL1*SELL:
INPUT FIX 4*40000:
COMPUTE GRS1=REV1-USL1*VCST;NET1=GRS1-FIX;TPAY=NET1*.22;NTI1=NET1-TPAY:
COMPUTE USL2=UNIT*.95;REV2=USL2*SELL:
COMPUTE GRS2=REV2-USL2*VCST;NET2=GRS2-FIX;TPAY=NET2*.22;NTI2=NET2-TPAY:
COMPUTE USL3=UNIT;REV3=USL3*SELL:
COMPUTE GRS3=REV3-VCST*USL3;NET3=GRS3-FIX;TPAY=NET3*.22;NTI3=NET3-TPAY:
COMPUTE USL4=UNIT*1.05;REV4=USL4*SELL:
COMPUTE GRS4=REV4-VCST*USL4;NET4=GRS4-FIX;TPAY=NET4*.22;NTI4=NET4-TPAY:
ROUND -1:
COMPUTE USL1=USL1-.1;REV1=REV1-.1;GRS1=GRS1-.1;NET1=NET1-.1;NTI1=NTI1-.1:
COMPUTE USL2=USL2-.1;REV2=REV2-.1;GRS2=GRS2-.1;NET2=NET2-.1;NTI2=NTI2-.1:
COMPUTE USL3=USL3-.1;REV3=REV3-.1;GRS3=GRS3-.1;NET3=NET3-.1;NTI3=NTI3-.1:
COMPUTE USL4=USL4-.1;REV4=REV4-.1;GRS4=GRS4-.1;NET4=NET4-.1;NTI4=NTI4-.1:
ROUND OFF:
FORM A4:

```

CallData Systems - CALLPLAN

P:.TYPE 610

610 SUPPRESS INFLATION RAW.MAT THRU DISTRIB FIX.COST TAX.PAY

P:.615 SUPPRESS PRICE

70 "-10.00 % SENSITIVITY ON UNITS SOLD"

WHAT-IF UNITS=UNITS\*.90

RULES

DISPLAY

REMOVE

70 "-5.00 % SENSITIVITY ON UNITS SOLD"

WHAT-IF UNITS=UNITS\*.95

RULES

DISPLAY

REMOVE

70 "0.00 % SENSITIVITY ON UNITS SOLD"

RULES

DISPLAY

REMOVE

70 "+5.00 % SENSITIVITY ON UNITS SOLD"

WHAT-IF UNITS=UNITS\*1.05

RULES

DISPLAY

\$PRINT, "\*\* SENSITIVITY ANALYSIS COMPLETE \*\*"

---

Compuserve - CUFFS

----- CHANGE.DATA(#400); SMALL REPORT; RERUN(3)

#400 SENSITIVITY ON UNITS SOLD (HIST&FUT) = -10%

#400 SENSITIVITY ON UNITS SOLD (HIST&FUT) = -5%

#400 SENSITIVITY ON UNITS SOLD (HIST&FUT) = 0

#400 SENSITIVITY ON UNITS SOLD (HIST&FUT) = 5%

---

Computer Sciences - FLARES

ledit mod01 modr4

^33\* unitfact=-10,-5,0,5

^35\*

^56.1\* left unitfact =',unitfact

^57\* show units,revnu,grossprof,netbet,netinc

^a

Comshare - FCS

COMMAND:SS -  
STEP SENSITIVITY  
FST PERIOD,LST PERIOD?1,4  
ROW NUMBER, FROM%, TO %, STEPS %?5,-10,5,5  
ROW NOS. TO DISPLAY?5,7,20,30,37

---

Control Data - IFPS

WHAT IF CASE 3, ENTER STATEMENTS  
? UNITS SOLD=UNITS SOLD-(.1\*UNITS SOLD),PREVIOUS\*1.15  
  
ENTER SOLVE OPTIONS  
? L2,L4,L9,L11,L13  
  
WHAT IF CASE 4, ENTER STATEMENTS  
? UNITS SOLD=UNITS SOLD-(.05\*UNITS SOLD),PREVIOUS\*1.15

---

Data Resources - EPS

1850 ...  
1855 ...QUESTION 3  
1860 SET VERSION = BASIC  
1870 EDIT NEWPRODSHORT AS NEWPRODSHORTER  
1880 DEL 6  
1890 SET VERSION = SALESDOWN10% OF BASIC  
1900 SALES = .90 \* SALES  
1901 DO REGENERATE  
1910 SET VERSION = SALESDOWN5% OF BASIC  
1920 SALES = .95 \* SALES  
1921 DO REGENERATE  
1930 SET VERSION = SALESDOWN0% OF BASIC  
1940 SET VERSION = SALESUP5% OF BASIC  
1950 SALES = 1.05 \* SALES  
1951 DO REGENERATE  
1955 ...STACK sets an option value while remembering the previous  
1956 ... setting.  
1957 ...Semicolons and ampersands link commands into a  
1958 ... compound command.  
1960 WRITE <VERSION = SALESDOWN10%> WITH YEARS, NEWPRODSHORTER;&&  
1970 STACK PAGEHEAD = "";&&  
1980 WRITE <VERSION = SALESDOWN5%> WITH YEARS, NEWPRODSHORTER;&&  
1990 WRITE <VERSION = SALESDOWN0%> WITH YEARS, NEWPRODSHORTER;&&  
2000 WRITE <VERSION = SALESUP5%> WITH YEARS, NEWPRODSHORTER  
2005 ...REVERT sets an option back to the previously STACKed value  
2010 REVERT PAGEHEAD  
2020 PRINT&STARTCLOCK <PROGRESS=#LOWPRINTER> 1

General Electric - FAL II

MODIFY ROW 505 COL 2 TO -0.10  
SET ROW 505 COL 2 TO -0.05  
SET ROW 505 COL 2 TO 0.0  
SET ROW 505 COL 2 TO 0.05

---

Informatics - SIMPLAN

ANALYSIS.

.enter 1 usold

USOLD ( 3) (	1-	1):
.45000		

ANALYSIS.

.solve realdl

ENTER "END" OR SPECIFY WHAT IS TO BE PRINTED  
.usold rev sprof nbt neti

ANALYSIS

.enter 1 usold

USOLD ( 3) (	1-	1):
.47500		

ANALYSIS.

.solve realdl

ENTER "END" OR SPECIFY WHAT IS TO BE PRINTED.  
.usold rev sprof nbt neti



Interactive Data - XSIM

DRIVER3 -

DO ORIGINAL\_UNITS = UNITS;  
& SENSREP -10  
& SENSREP -5  
& SENSREP 0

SENSREP -

DO UNITS = ORIGINAL\_UNITS \* (1 + 81 "PERCENT CHANGE")/100:

& RUN MOD;

GENREP COMMA

TITLE<81% SENSITIVITY ON UNITS SOLD>

REP14 -

ROWTITLE<QUESTION 3>  
UNITS<UNITS SOLD>  
REVENUE<REVENUE>  
GROSPROF<GROSS PROFITS>  
NETPROF<NET BEFORE TAXES>  
NETINC<NET INCOME>

'77 TO 80;

---

On-Line Systems - PAMS

/\*A N

\*\*@ 10 -10

/\*A N

\*\*+ 10 5

On-Line Systems - OLSFMS

\$ TYPE REPORT 103

00100 MAR;  
00110 WID 62  
00120 DEP -20  
00130 MON  
00140 ACC 0  
00150 ;  
00160 CEN  
00170 TIT;  
00180 TIT .;% SENSITIVITY ON UNITS SOLD  
00190 BLA  
00200 ;  
00210 ALI  
00220 HEA;YEAR 1,YEAR 2,YEAR 3,YEAR 4  
00230 SCO  
00240 ;  
00250 PRI #,UNITS,REVEN,GROSS,NET,INCOM  
00260 ;  
00270 END

\$ RUN WITH ZUNIT=-10.0  
EXECUTING MODEL 100  
\$ USE TITLE -10.00  
\$ P REP 103

\$ RUN WITH ZUNIT=-5.0  
EXECUTING MODEL 100  
\$ USE TITLE -5.00  
\$ P REP 103

---

Rapidata - FISCAL

0090 MODIFY\* 1010 1 4\*-.1  
0100 PRI CR ACC 1010 1030 2020 2040 2060  
0110 NEXT  
0120 MODIFY\* 1010 1 4\*-.05  
0130 PRI CR ACC 1010 1030 2020 2040 2060  
0140 NEXT  
0150 PRI CR ACC 1010 1030 2020 2040 2060  
0160 NEXT  
0170 MODIFY\* 1010 1 4\*.05  
0180 PRI CR ACC 1010 1030 2020 2040 2060

Ross Systems - MAPS

ENTER VALUE FOR PCT INCREASE IN UNITS  
? -.1  
ENTER VALUE FOR PCT INCREASE IN PRICE  
? 0  
ENTER VALUE FOR 0=DETAIL, 1=SUMMARY  
? 1

ENTER VALUE FOR PCT INCREASE IN UNITS  
? -.05  
ENTER VALUE FOR PCT INCREASE IN PRICE  
? 0  
ENTER VALUE FOR 0=DETAIL, 1=SUMMARY  
? 1

---

Scientific Time Sharing - FPS

SENSITIVITY SESSION SETUP

DATABASE 3384725 NEWPRD

SENSITIVITY SESSION NO. 1 SAVED 9/22/77 AT 15:03  
NUMBER OF ITERATIONS = 4  
MINIREPORT TO USE = 0

\*\*\*\*\*MODEL ELEMENTS VARIED\*\*\*\*\*

\*\*YDS 1 VAR TYPE = MUL PRINT DATA = 12 N  
INITIAL VALUE 50000 57500 66125 76044  
MUL FACTORS 1 0.9 0.95 1.05

Scientific Time Sharing - FPS (Continued)

SENSE MODEL

```
V NEWPROD3
[1] +SEGMENT 1
[2] UNITS+[YDS 1
[3] INFLATION+CUMPROD YDS 3 R INFLATION FACTOR
[4] 1 EQ UNITS
[5] 2 EQ YDS 2 R PRICES
[6] 3 EQ UNITS*L 2 R REVENUE
[7] 4 5 6 7 MEQ(P 3 4 5 6) MPROD UNITS*INFLATION
[8] 8 EQ(L 3)-SUM 4 5 6 7
[9] 9 EQ YDS 4
[10] 10 EQ(L 8)-L 9 R NET INCOME BEFORE TAXES
[11] 11 EQ 0.22*L 10 R TAX AMOUNT
[12] 12 EQ(L 10)-L 11 R NET INCOME AFTER TAXES
[13] SNAPSHOT
[14] +END
```

V

SENSE REPORT

```
V SNAPSHOT
[1] 1 2 3 4 QUICK 1 2 3 8 10 12
V
```

---

Service Bureau - PROPHIT II

```
COMMAND? WWHAT-IF
WHAT-IF DEFINITION FILE? (T)
REPORT INFILE,OUTFILE? NPPREP,UNIT1
UNIT1 DOES NOT EXIST BUT IS NOW BEING CREATED
LINE? 1000
TYPE,FIRST, LAST COLUMN? PER,1,4

PERCENT ADDED? -10
LINE? 0
REPORT FILE UNIT 1COMPLETED

COLUMNS? ALL
TOTAL COLUMNS? NO
LINES? SEL
LINES; AFTER LAST 0*
? %1000,1100,1300,1400,1500,0
```

Time Sharing Resources - INSIGHT

```
ACTION:  **START
* STARTING AT STEP 1 *
ACTION:  ID
ENTER FILE ID:  FWORK
INPUT LINES, COLUMNS OR PARAMETERS [LCP]?  P
* ENTER PARAMETER ID; VALUE.  END WHEN COMPLETE *
ENTER:  **
* STOPPING AT STEP 3 *
ENTER:  1 2;w10 0
ENTER:  **FINISH
* STARTING AT STEP 1 *
ENTER:  X
```

```
ACTION:  PR
ENTER REPORT ID:  NEWQ3
ENTER FILE ID:  FWORK
OUTPUT HERE, TSR OR FILE [HTF]?  **
* STOPPING AT STEP 4 *
OUTPUT HERE, TSR OR FILE [HTF]?  F
FILE NAME SELECTED:  INS
```

```
ACTION:  *START
ENTER:  1;w5
ENTER:  *FINISH
OUTPUT HERE, TSR OR FILE [HTF]?  F
FILE NAME SELECTED:  INS
```

```
ACTION:  *START
ENTER:  1;0
ENTER:  *FINISH
OUTPUT HERE, TSR OR FILE [HTF]?  F
FILE NAME SELECTED:  INS
```

```
ACTION:  *START
ENTER:  1;5
ENTER:  *FINISH
OUTPUT HERE, TSR OR FILE [HTF]?  F
FILE NAME SELECTED:  INS
```

```
ACTION:  )PRINT INS
```

---

Tymshare - B8L

```
-TYPE WHAT2.DAT
QUESTION 3
.9,1.05,.05
1,1,1
```

Tymshare - EXPRESS

RELEASE UNITS  
SET UNITS UNITS\*.9  
TBL LINEVAR

RELEASE UNITS  
SET UNITS UNITS\*.95  
TBL

---

United Computing Systems - FORESIGHT

00010 TERM = 5  
00030 HIS  
00040 MODELA  
00045 DATA 'RUN-4'  
00050 L 101.1 '-----'  
00120 L 109.5 '\*TEMP1' = 43478.26, L109.5() \* 1.15 + .5,TR  
00130 L 109.7 '\*SENSITIVITY' = .9  
00135 CH L 100 ' -10 PCT'  
00140 CH L 110 = L 109.5 \* L109.7  
00160 CALC  
00165 PR L 101.1  
00170 PR L 100 110 150 230 260 290  
00190 CH L 100 ' -5 PCT '  
00200 CH L 109.7 = .95  
00210 CALC  
00215 PR L 101.1  
00220 PR L 100 110 150 230 260 290  
00225 CH L 100 '100 PCT UNITS'  
00230 CH L 109.7 = 1.0  
00235 PR L 101.1  
00240 CALC  
00250 PR L 100 110 150 230 260 290  
00255 CH L 100 '105 PCT UNITS'  
00260 CH L 109.7 = 1.05  
00270 CALC  
00275 PR L 101.1  
00280 PR L 100 110 150 230 260 290  
00285 PR L 101.1  
\*RDY\*



## SUMMARY

The full report contains an extensive analysis of all seven benchmark problems. In addition to the type of information found in the New Product problem extract, RDC presents a commentary of each system with respect to:

- relative costs
- ease of use
- completeness
- documentation
- storage & connect charges
- special analyses

There are two other sections of the report. The Vendors and Product Information section of the report presents the vendors' responses to the RDC questionnaires. The results of these questionnaires have been compiled in order for the user to get answers to specific questions on the overall capabilities of the companies and the specific products involved in the report.

The purpose of RDC's published report was to provide the users with an understanding of the alternatives available for computerized financial reporting and modeling systems. It is our hope that this extract provides an understanding of how we approached this difficult and complex problem. Interested parties may purchase the 329 page report A Comparative Analysis of Financial Reporting and Modeling Systems - Second Edition, for \$695.00 plus postage, handling, and applicable sales tax by sending a letter or purchase order to:

REAL DECISIONS CORPORATION  
870 High Ridge Road  
Stamford, Connecticut 06905  
(203) 329-2071



**The Association of  
Time-Sharing Users**

*interactive  
computing*  
The Newsletter of The Association of Time-Sharing Users

## **MAKING A VENDOR DECISION**

by

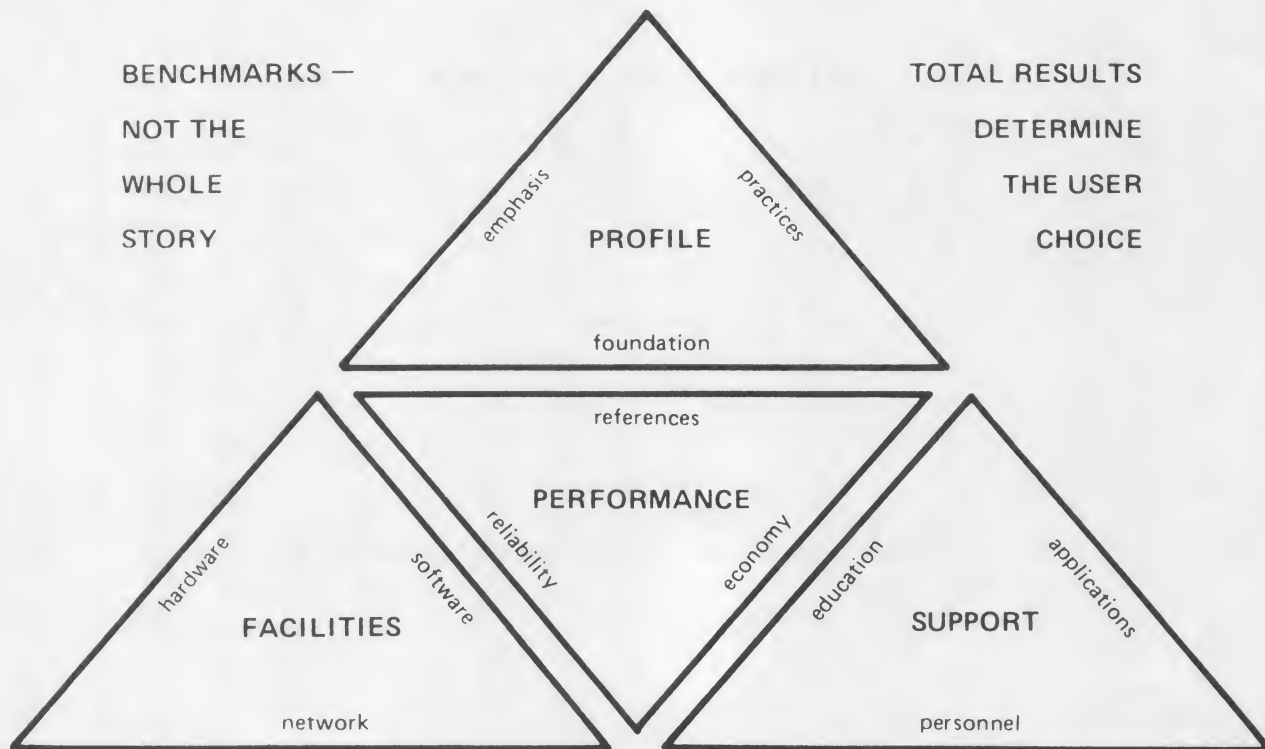
John Lewis  
Real Decisions Corporation

Reprinted from the Jan/Feb 1976 issue of Interactive Computing

*ATSU asked John Lewis, President of Real Decisions Corporation, if he would outline some of the factors a user should consider in choosing a supplier of time-sharing services. We are happy to provide his response, which appears to be one of the most comprehensive available, presented in an original way.*

### **Making a Vendor Decision**

Making a decision between vendors of Remote Computing Services comes after a review of your corporate DP facilities, current needs, level of satisfaction, and your basic objectives and long term plans. The following is a graphic summary of the factors that should be considered in choosing a vendor, with emphasis on four decision triangles that we developed:



The value of a service is determined by a combination of factors in the decision triangles, weighted by the user needs. It is important:

- To understand the **PROFILE** of a vendor – his business foundation, emphasis and practices
- To examine the **FACILITIES** – that specific set of hardware, software and network utilized
- To evaluate the available **SUPPORT** – types of personnel, applications and educational help
- And, with this background, **PERFORMANCE** can be judged – based on user references, economy of operation and overall service capabilities

Each of the illustrated decision triangles is important to the total service, and some highlights are noted in the following sub-sections to exemplify significant areas of analysis and points to pursue in decision making.



### 1. FOUNDATION on which the service has been built.

- The origins of the vendor in Remote Computer Services.
- The ownership of the company - subsidiary, private, public. . .
- Historical growth trends in revenue & profit.
- Stability of corporate management team.
- Level of expenditures in development.

### 2. EMPHASIS on types of users and services.

- Batch, remote batch & timesharing activities.
- Type of industries which provide source of revenue.
- Size of companies and geographic locations of users.
- Availability of problem solving 'tools' or application packages.
- Other types of services offered.
- Corporate forecast of future position in the industry.

### 3. PRACTICES in the daily operation of the business.

- Approach to pricing in areas like discounts & surcharges.
- General style of user support.
- Normal means of handling bulk reports.
- Policy toward turnaround and response times.
- The build or buy decisions for application products.
- System availability, both scheduled & non-scheduled.

### 1. HARDWARE used in the operating center(s).

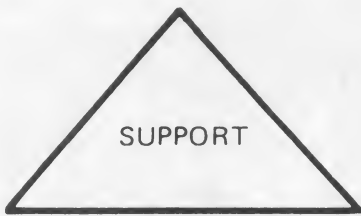
- Type & number by manufacturer & model.
- Backup and alternate CPU & file equipment.
- Storage capabilities on tape & disk by type & amount.
- Limitations on core by users.
- Computational power & precision.
- Normal operating procedures when changes are made.
- Proximity of operating centers.
- Physical characteristics like power supply, building construction, storage vaults, alarms & guard services.

### 2. SOFTWARE to allow use of the hardware.

- Utility routines for general use.
- Variety of languages made available.
- Comparison of compilers used in timesharing & batch mode.
- Compatibility with in-house installation.
- Aids for use in program development & maintenance.
- Procedures used to notify users of software changes.
- Ability to handle common files between timesharing & remote batch.

### 3. NETWORK to permit access to hardware & software.

- Location of sales & technical support groups.
- Availability of local dial access.
- Cities providing public terminals.
- Intelligence level of network to improve reliability.
- Terminals and line speeds that are handled.
- International access points on service network.



**1. PERSONNEL to help use the facilities effectively.**

- Competence of the sales representatives.
- Effectiveness of the technical support team.
- Availability of industry/application expertise.
- Geographic locations of vendor support people.
- Assignment of backup support.
- Local and/or national hotline - response & quality.

**2. APPLICATIONS to permit fast & economic utilization.**

- Emphasis on specific industries.
- Availability of proprietary data bases.
- Provision of tools to aid in problem solving.
- Appropriate prepackaged systems to use intact.
- Development performed in-house or purchased outside.
- Execution of same programs in timesharing or remote batch.

**3. EDUCATION to teach how to use the service.**

- Training courses for potential programmers.
- Provision of high quality documentation.
- Training courses for terminal operators.
- Availability of computer assisted instruction.
- Training courses for management level people.
- Facilities for training on user premise or vendor location.

**1. REFERENCES from users of the service.**

- Long and short term users.
- Users with appropriate geographic distribution.
- Companies in similar industries.
- Users with the same application requirements.
- Experienced users of multiple vendors.

**2. ECONOMY of use for specific and general requirements.**

- Availability of statistics for administrative controls.
- Means used by vendors to measure resources.
- Factors employed in billing algorithms.
- Actual cost of service.
- Costs and problems involved in potential conversions.

**3. CAPABILITY of the service as viewed from experience.**

- Ease of use from human engineering standpoint.
- Widespread geographic coverage of support & network.
- Response of facilities and personnel.
- Security of user programs & files.
- Stability & reliability of hardware, software & network.

IN SUM, the evaluation of factors described within the specific decision triangles will result in the following equation:

$$\text{PROFILE} + \text{FACILITIES} + \text{SUPPORT} + \text{PERFORMANCE} = \text{CHOICE}$$

The processes described in the foregoing sub-sections represent some of the analyses users should perform when deciding among potential vendors of Remote Computer Services. Note that one specific leg of the PERFORMANCE triangle deals with economy, and only one factor under economy concerns benchmarks—a procedure widely used to test efficiency, measure response time and evaluate costs of various services. It is this specific cost comparison which our extract provided to ATSU addresses. Results from such benchmark efforts can contribute to the overall task of evaluating competing services, but the proper use of benchmarks is essential. They are certainly not the whole story, and total results must still determine each user's choice.



AN EXTRACT FROM

**THE COMPARATIVE TIME-SHARING  
COST ANALYSIS REPORT**

JANUARY, 1978

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*NOTE: ATSU's distribution of this extract is solely for the information and independent evaluation by its members, and does not in any way constitute verification of the data contained, concurrence with any of the conclusions herein, or endorsement of the products or services of the vendors mentioned. The vendors included in this extract were chosen solely by RDC, and although ATSU was consulted for advice, the Association was not involved in any way in the preparation of their copyrighted comparative analysis.*



## PREFACE

This Extract has been taken from the report entitled The Comparative Time Sharing Cost Analysis Report published by Real Decisions Corporation in December, 1976 and updated in August, 1977. RDC has used its best efforts to ensure the accuracy of the information contained herein. The processes described in this Extract should be viewed as only one factor in evaluating any given vendor's capabilities. Vendors included in the Extract are:

<u>VENDOR NAME</u>	<u>LOCATION</u>	<u>HARDWARE</u>
ADP ADP Network Services, Inc.	Ann Arbor, MI	DEC
BCS-C Boeing Computer Services, Inc.	Seattle, WA	CDC
BCS-I Boeing Computer Services, Inc.	Seattle, WA	IBM
CDS-H CallData Systems, Inc.	Woodbury, NY	Honeywell
*CDS-D CallData Systems, Inc.	Woodbury, NY	DEC
COM Comshare, Inc.	Ann Arbor, MI	Xerox
CSC Computer Sciences Corp.	El Segundo, CA	Univac
CSV CompuServe Network, Inc.	Columbus, OH	DEC
CYB Cybernet Ser. (Control Data)	Minneapolis, MN	CDC
*FD First Data Div. (ADP Network)	Ann Arbor, MI	DEC
GE General Electric	Bethesda, MD	Honeywell
*IDC Interactive Data Corporation	Waltham, MA	IBM
*INF Informatics, Inc.	Fairfield, NJ	IBM
*ISC Interactive Sciences Corporation	Braintree, MA	DEC
MCA McDonnell Dougals Automation Co.	St. Louis, MO	Xerox
NCS National CSS, Inc.	Norwalk, CT	IBM
OLS On-Line Systems	Pittsburgh, PA	DEC
RAP Rapidata, Inc.	Fairfield, NJ	DEC
SBC Service Bureau Co.	Greenwich, CT	IBM
TYM-D Tymshare, Inc.	Cupertino, CA	DEC
TYM-I Tymshare, Inc.	Cupertino, CA	IBM
USC United Computing Systems, Inc.	Kansas City, MO	CDC

\* Not included in last year's report.

## INTRODUCTION

The primary purpose of this report is to compare effective costs of operation and pricing structures of various time sharing services utilizing two standardized programs--one in FORTRAN and the other in BASIC. Both programs were designed and written by RDC to utilize comparable resources on all the vendors. Costs were then calculated for CPU, I/O, Connect and Storage resources at the standard prime time interactive rates prevailing at the time the runs were completed. These programs were run during September, October, and November, 1976 and updated, where necessary, in July and August 1977.

In the extract prepared by RDC from the report published in December 1976, two CPU-intensive runs were featured--A 1 a FORTRAN program and B 2 a BASIC program. The A 1 program was re-run for this year's report exactly the way it was done in 1976 and designated as number 11. The objective in re-running this program for this year's report was to illustrate the effect of price and/or algorithm changes between December, 1976 and December, 1977. The other program used in this extract is one of several new programs included in the current report. It is written in BASIC and performs a file sort and report preparation task. The designation for this run is number 61.

RDC is attempting to provide guidelines in the price performance and capability areas of various services. The results are not represented as conclusive proof of any vendor's total price performance capabilities. Individual user requirements would necessarily demand more specific evaluation of pertinent factors. RDC does not represent that the vendors included comprise a comprehensive list of all time sharing vendors. In all cases RDC personnel operated the terminals and analyzed the results.

## CHANGES IN VENDOR PRICING FROM 1976 to 1977

The following chart presents the resource charges in effect for each vendor as of December 1, 1977. Vendors' pricing changes were illustrated in the full report by re-running a series of programs used in the 1976 report. In some instances the pricing factors have been altered, in others the algorithm has been changed significantly, and in still others various changes in hardware or software have caused differences in cost for specific types of use. Year-to-year variance can also be caused by fluctuations in user loads similar to that seen on some services on a day-to-day or even hour-to-hour basis. The majority of services in the 1976-77 report are able to be compared directly with specific data points from the prior year.

The report, originally published in December, 1976, covered the results of running several standardized FORTRAN and BASIC programs on eighteen (18) different Time Sharing services. A great deal of activity has occurred in the Remote Computer Services industry in the past 9 months. Informatics, Inc. acquired the IBM hardware based business of Rapidata, ADP Network Services, Inc. acquired First Data Corporation and now operates it as a division of ADP. Several additional vendors' services have been added to the report in this update:

### DEC Services

CallData Systems, Inc.

First Data Division of ADP Network Services, Inc.

Interactive Sciences Corporation

### IBM Services

Interactive Data Corporation

Informatics, Inc.

A significant number of price changes (mostly increases) were instituted by several of the vendors:

- Comshare, Inc. reduced costs by implementing a new BASIC compiler as of July, 1977.
- CompuServe, effective January 1, 1977, reduced its storage charges by 9%.
- Cybernet (CDC) posted a 16% increase in CPU charges effective December, 1976.
- General Electric had a 9% increase in CPU charges and a 10% increase in connect charges effective July 1, 1977.
- National CSS, Inc. changed their pricing from VPU's to ARU's effective April 1, 1977 and then modified their algorithm effective December 1, 1977. Run 61 was made using their recently released BASIC compiler.
- Service Bureau, effective February 1, 1977, posted a 12% increase in CPU charges and a 7% increase in Storage charges.
- Tymshare instituted a 20% increase in Connect charges effective March 1, 1977.
- United Computing Systems shows reduced costs because runs were made under a more favorable pricing option.

The effects of these changes are apparent when one reviews the results of running the benchmark programs compared to the results in December, 1976.

DECEMBER, 1977 VENDOR COSTS FOR CPU, CONNECT AND STORAGE

<u>VENDOR</u>	<u>CPU CHARGES</u>	<u>UNIT OF MEASURE</u>	<u>CONNECT 30 CPS</u>	<u>STORAGE (1000 CHAR/MO)</u>
ADP	\$.02/CRU	Comp. Res. Unit	\$15.00	\$1.0000
BCS-C	\$2.00/CCU	Comp. Chg. Unit	\$11.00	\$ .2578
BCS-I	\$.15/CSU	Comp. Serv. Unit	\$10.00	\$ .1692
CDS-D	\$.03/Second	CPU Second + \$.01/KCS	\$ 8.00	\$ .3906
CDS-H	\$.165/Second*	CPU Second	\$ 9.50	\$ .5000
COM	\$.07/CCU	COM. Comp. Unit	\$12.00	\$ .1465
CSC	\$.29/SRU	Sys. Res. Unit	\$13.75**	\$ .4394
CSV	\$.02/SRU	Sys. Res. Unit	\$14.50	\$ .4687
CYB	\$.35/SBU	Sys. Bill Unit	\$15.25**	\$ .3750
FD	\$.0110/CRU	Comp. Res. Unit	\$ 7.50	\$ .3000
GE	\$.12/CRU	Comp. Res. Unit	\$15.00**	\$ .1719
IDC	\$.16/Unit	CPU Unit	\$13.00	\$ .1644
INF	\$.58/Sec*	CPU Second	\$11.00	\$ .1644
ISC	\$.01/CRU	Comp. Res. Unit	\$ 9.00	\$ .4687
MCA	\$.22/MRU	Main Res. Unit	\$10.00	\$ .5078
NCS	\$.20/ARU	Appl. Res. Unit	\$13.00	\$ .1833
OLS	\$.05/CPU	Core Proc. Unit	\$10.00	\$ .4688
RAP	\$.06/CPU	Cent. Proc. Unit	\$13.00	\$ .2400
SBC	\$.18/PU	Proc. Unit	\$15.00	\$ .6617
TYM-D	\$.12/TRU	Tym. Res. Unit	\$12.00	\$ .4500
TYM-I	\$.25/TRU	Tym. Res. Unit	\$12.00	\$ .1410
UCS	\$.25/SU-A	System Unit	\$15.00	\$ .2441

\*In addition, I/O units are charged for disk and/or other resource access.

\*\*Net Charge based on 25,000 characters/hour.

DESCRIPTION AND ANALYSIS

This two-part BASIC program, representative of a standard business application, was designed to test the efficiency of the I/O operations. The first part of the program consists of a sort and merge routine applied to an input file, and the second part is an interactive routine which produces tabular output at the terminal.

The input file consists of 64 ten-word blocks each containing a unique integer between 1 and 64 in the first word, or keyword. The keywords are randomly ordered. Words two through four of each block contain functions of the integer. The blocks are then sorted and merged onto a new disk file so that the first word of each block forms the ordered sequence of integers from 1 to 64. Four temporary disk files are used in this process. All of the input and output is read and written using binary sequential file operations if available; otherwise the fastest possible operations are used for each given system.

The second part of the program requests two input values. The numbers 4 and 37 are entered, and for each integer from 4 to 37 a line of output is printed consisting of the integer and its three corresponding functions. The mean and variance of each of the functions are computed over the 34 values and printed out. The program consists of approximately 160 BASIC statements and was run in a comparable manner on all services.

The following chart presents the CPU units and costs for each vendor to complete this run. Arbitrary combinations of connect time and storage utilized are costed and added to actual CPU costs to reflect the total costs of making such a run. All costs for connect time are calculated at 9 minutes at standard 30 CPS rates, with a net charge based on 25,000 characters per hour where variable rates apply. Storage costs are calculated at 3750 characters based on standard rates for the first 500,000 characters of storage per month.



DESCRIPTION AND ANALYSIS - continued

For both the CPU and Total Costs we determined the highest price/performance vendor, then calculated the percentage that each of the other vendor's CPU or Total Costs represent of the highest vendor's respective costs. In this way one can see the dramatic differences that exist between the various vendors for the same job. In addition one can see that the effects of adding connect and storage costs to CPU charges changes the comparative standings of many vendors. The two graphs on the following pages show the CPU versus Total Costs for each vendor based upon the percentage of highest vendor calculation described above. Some observations can be made as follows:

- Vendors with high Storage rates are adversely affected when Storage costs are added to CPU costs e.g. CDS, CSC, CSV, CYP, MCA, OLS, and SBC.
- Vendors with both high Storage and high Connect rates are dramatically affected when such costs are added to CPU costs e.g. CSV, CYP and SBC.
- Some vendors remain relatively constant in the relationship to the highest vendor after Storage and Connect charges are added to CPU costs e.g. COM, GE, NCS, TYM-D, and TYM-I.

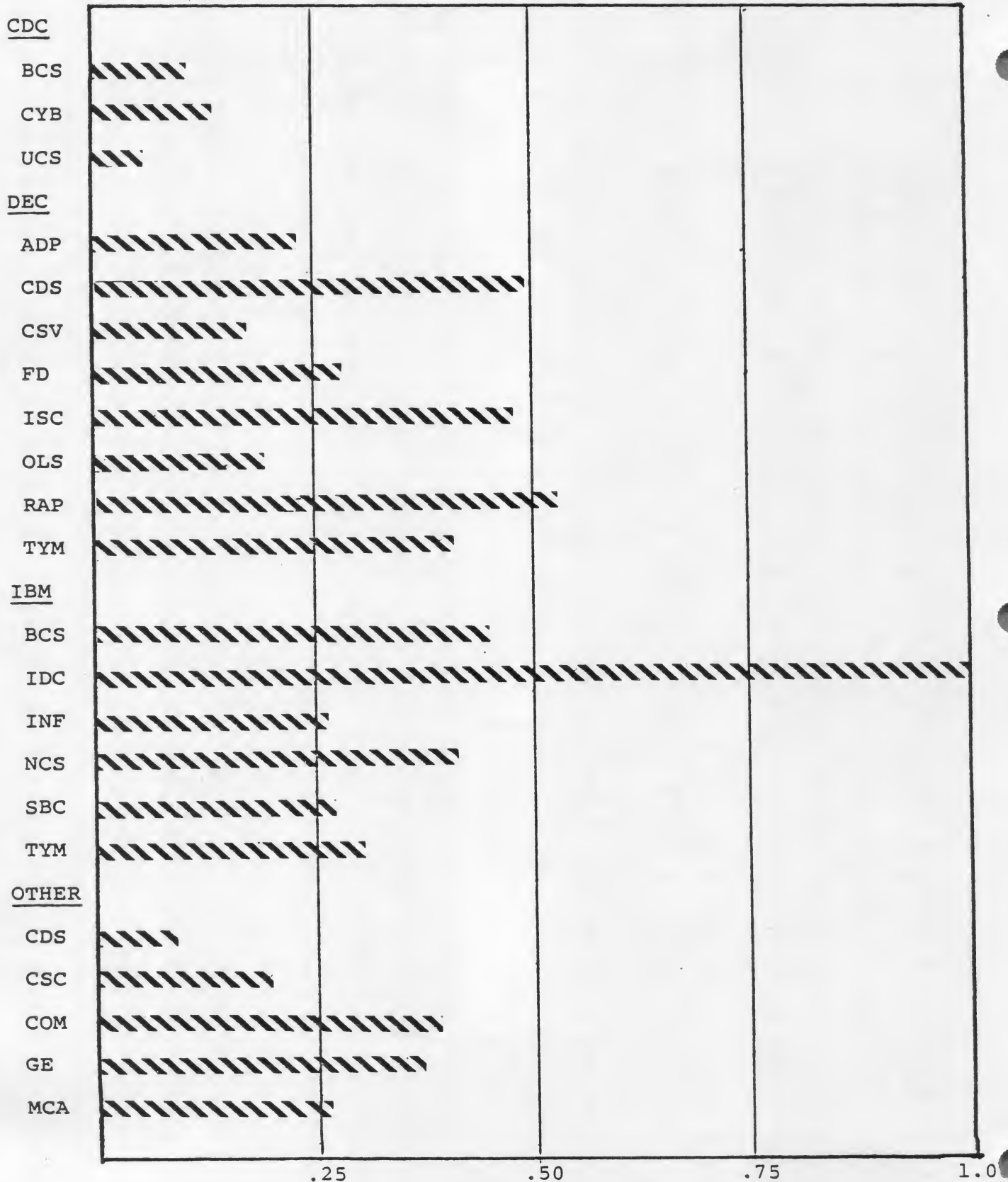
RUN 61 - COMMERCIAL SORT AND REPORT BASIC RUN

CPU, CONNECT AND STORAGE COSTS

<u>VENDOR</u>	<u>CPU</u> <u>UNITS</u>	<u>COST</u>	<u>% OF</u> <u>HIGHEST</u> <u>VENDOR</u>	<u>CONNECT</u> <u>COSTS</u>	<u>STORAGE</u> <u>COSTS</u>	<u>TOTAL</u> <u>COSTS</u>	<u>% OF</u> <u>HIGHEST</u> <u>VENDOR</u>
ADP	84.000	\$1.68	24%	\$2.25	\$3.75	\$7.68	81%
BCS-C	00.390	\$0.78	11%	\$1.65	\$0.97	\$3.40	36%
BCS-I	21.290	\$3.19	46%	\$1.50	\$0.63	\$5.32	56%
CDS-D	7.940	\$3.46	50%	\$1.20	\$1.46	\$6.12	64%
CDS-H	2.810	\$0.62	9%	\$1.43	\$1.88	\$3.93	41%
COM	40.000	\$2.80	40%	\$1.80	\$0.55	\$5.15	54%
CSC	4.900	\$1.42	20%	\$2.06	\$1.65	\$5.13	54%
CSV	63.000	\$1.26	18%	\$2.18	\$1.76	\$5.20	55%
CYB	2.798	\$0.98	14%	\$2.29	\$1.41	\$4.68	49%
FD	181.000	\$1.99	29%	\$1.13	\$1.13	\$4.25	45%
GE	21.88	\$2.63	38%	\$2.25	\$0.64	\$5.52	58%
IDC	43.49	\$6.96	100%	\$1.95	\$0.62	\$9.53	100%
INF	2.87	\$1.91	27%	\$1.65	\$0.62	\$4.18	44%
ISC	340.00	\$3.40	49%	\$1.35	\$1.76	\$6.51	68%
MCA	2.914	\$0.64	9%	\$1.50	\$1.90	\$4.04	42%
NCS	14.450	\$2.89	42%	\$1.95	\$0.69	\$5.53	58%
OLS	28.000	\$1.40	20%	\$1.50	\$1.76	\$4.66	49%
RAP	62.330	\$3.74	54%	\$1.95	\$0.90	\$6.59	69%
SBC	11.000	\$1.98	28%	\$2.25	\$2.48	\$6.71	70%
TYM-D	24.180	\$2.90	42%	\$1.80	\$1.69	\$6.39	67%
TYM-I	8.540	\$2.14	31%	\$1.80	\$0.53	\$4.47	47%
UCS	2.800	\$0.42	6%	\$2.25	\$0.92	\$3.49	37%

## SORT &amp; REPORT

1.00 = \$6.96



RUN 61 - CPU Costs

# COMMERCIAL SYSTEM

## SORT & REPORT

1.00= \$9.53

### CDC

BCS

CYB

UCS

### DEC

ADP

CDS

CSV

FD

ISC

OLS

RAP

TYM

### IBM

BCS

IDC

INF

NCS

SBC

TYM

### OTHER

CDS

CSC

COM

GE

MCA

.25

.50

.75

1.00

RUN 61: Medium Connect & Medium Storage

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## SUMMARY

Making a decision between vendors of Remote Computing Services comes after a review of your corporate DP history, current facilities and level of satisfaction in line with your basic objectives and long term plans. Once you understand your current workload, project future requirements and establish acceptable standards, you are ready to get down to the serious work of vendor selection or review. There are many elements to consider in determining the right vendor for you and your application. This extract only deals with one of those elements-- benchmark costs. The report from which this extract is drawn covers a more complete analysis of costs plus illustrations of the ease of use characteristics of all twenty-two vendor services. While costs are only one factor to consider in making a vendor decision, RDC believes that the dramatic differences in costs illustrated by the full report provides enough reason to carefully evaluate alternative vendors.

Interested parties may purchase the updated 117 page report The Comparative Time Sharing Cost Analysis Report for \$695.00 plus postage, handling and applicable sales tax by sending a letter or purchase order to:

REAL DECISIONS CORPORATION  
870 High Ridge Road  
Stamford, CT 06905  
203/329-2071

# All About Time-Sharing and Remote Computing Services

Commercially available remote computing services are expanding rapidly both in scope and size as a viable alternative to in-house computer systems. The types of services currently offered include interactive time-sharing for scientific and business computation, dedicated facilities for specific industry applications, and general-purpose remote batch processing facilities. In most cases you can make use of these services by simply installing a teletypewriter or other data terminal in your office and communicating, via telephone lines, with one or more powerful computers that may be located locally or hundreds of miles away.

The firms offering remote computing services have been generally experiencing a long-term revenue boom in spite of—or perhaps as a result of—the recent poor economy. Some of the more than 100 companies currently in operation are experiencing annual growths in revenues as high as 50 percent, with no foreseeable signs of diminishing. Moreover, the industry as a whole now appears to be well established in terms of stability and profitability.

The remote computing service companies owe their existence and rapid growth to a number of generally accepted tenets:

- Because of the inherent economics of computer production and operation, it's usually cheaper to use a



Keydata Corporation, which claims to be the nation's oldest commercial time-sharing service company, now provides business data processing services to more than 400 companies throughout the U.S. and Canada. More than 850 terminals are connected to Keydata's Foxboro, Massachusetts, computer center via a nationwide communications network. The terminals may be either hard-copy or CRT display units like the ones shown here.

This comprehensive report explains both interactive time-sharing and remote batch processing, discusses their advantages and disadvantages, summarizes the current services offered by 100 remote computing companies, suggests guidelines for selecting a suitable supplier, and reports on an extensive user survey conducted jointly with the Association of Time-Sharing Users, Inc.

small piece of a large computer system than a large piece (or all) of a small one.

- Computers should be easy to use and should maximize the efficiency of the *people* who use them.
- Thousands of prospective users *want* and need a convenient, economical source of computer power.
- Present equipment, software, and communications technology makes it practical to divide the resources of a large computer system among many simultaneous users at remote terminals.
- Individual requirements for computing resources tend to fluctuate considerably over a period of time.

Currently available remote computing services can be broadly classified as either interactive time-sharing or remote batch processing services. Many companies now provide both types of services, and the frequently blurred distinctions between them are likely to virtually disappear as multifunction remote batch terminals come into widespread use for a variety of applications, including local clustered time-sharing and data entry, as well as classical remote batch.

In general, an *interactive time-sharing system* can be defined as a computer system that enables multiple users to gain simultaneous access to its facilities and to interact with the system in a conversational mode. A *remote batch processing system* can be defined as a system that enables users at remote locations to enter data, initiate the batch-mode execution of programs, and receive the resulting output data. Ideally, either type of system should give each user the impression that all the computational, storage, input/output, and software resources he needs are continuously at his disposal, while keeping him unaware of the fact that he is actually competing with many other customers for the use of these resources.

## How Remote Computing Evolved

The earliest remote computing systems were developed in the universities in the early 1960's, with Dartmouth and





## All About Time-Sharing and Remote Computing Services

➤ M.I.T. in the vanguard. These were interactive time-sharing services designed for scientists and engineers who wanted to use the computer's vast computational power to solve problems. Problems confronting scientists and engineers typically have this in common: they tend to require comparatively little input and output, often involve no files of data, and generally demand large, complex calculations.

For these users, the least expensive and slowest computer terminals, such as teletypewriters, suited their purposes quite well.

Also, many of the scientists and engineers wanted to program the computers themselves. To meet this need, the time-sharing services provided easy-to-use conversational language capabilities. That is, the user entered his program commands a statement at a time, in one of the programming languages available to him on the system. The language was usually BASIC (Beginner's All-purpose Symbolic Instruction Code) or FORTRAN (FORmula TRANslation). As the program commands were keyed in, the computer checked them for proper syntax (rules of the language) and stored them. When the user indicated that the last statement had been entered, the computer rechecked the overall syntax and compiled the program by translating the commands into its own machine language. Once the program was compiled, the user could enter his data. Then the data would be processed as the program steps dictated, and the answer presented at the terminal.

That's interactive time-sharing in a nutshell. The user just uses a little of the computer's time to compute a solution for himself. Of course, there are many refinements. One of the foremost among these is the option for the user to store useful programs for reuse in a library. This type of interactive time-sharing is still in widespread use among scientists, engineers, statisticians, and business planners.

But just as the computer itself has evolved from its initial role as a gigantic calculator into an everyday business tool, so has time-sharing, becoming today's remote computing industry. Whereas the scientific user typically requires a great deal of computing power and very little input and output data involving almost no files, the business user tends to require the capability for a comparatively large volume of input, maintenance of organized files, formatted output, and just enough computational power to perform a relatively simple process upon the data.

And just as the programming language is important to the scientific user, the program library is important to the business user. While the former may have wanted to keep a few useful computational routines in the library, the business user absolutely requires a library of processing programs that will ensure that the system is always prepared to operate on and process his current data in an appropriate and uniform fashion. Importantly, if the program library is adequate, the user need not know or

care about the programming language; he only has to know how to prepare the data and specify initiation of the desired process. Indeed, many remote computing vendors will create the programs for their users or install into the library "packaged" programs that the users require.

The business user's requirements for a terminal can also be quite different from those of scientific users. Business users tend to input batches of data which must be processed against files in order to produce results (such as a payroll), to generate reports, or to maintain the files through additions, deletions, or changes. Most business users of remote computing services today therefore employ remote batch processing terminals and methods, which usually lead to lower overall costs for processing a given volume of data than the interactive approach.

### The Remote Computing Industry

The first commercial time-sharing services were established in 1965. Both the suppliers and the users of these early services had to overcome many problems, and progress was quite slow at first. But by 1968, time-sharing had become the hottest topic in the computer industry and the darling of Wall Street, and it seemed as if everybody was trying to get into the act.

Unfortunately, the economic crunch that began in 1969, coupled with the sadly misdirected technical and sales efforts of many of the young time-sharing firms, led to a severe shakeout. New customers were hard to find, and it became virtually impossible to raise capital to start a new remote computing company or nurture an existing one. Dozens of remote computing service firms merged with other companies, abandoned their remote computing efforts in favor of more promising activities, or closed their doors completely.

Even today, there are still companies leaving the business, one of the largest being Leasco Response, which recently sold its customer base to Tymshare. Meanwhile, a significant number of users have converted from remote computing services to in-house systems. The economics and performance of the newly emerging minicomputer systems have enabled many users to justify purchase of their own systems.

However, despite the inevitable business fluctuations, the industry has survived its infancy and must be regarded today as a healthy, fast-growing segment of the computer business. Remote computing is here to stay. It represents an effective solution to some or all of the information processing requirements of many companies, and new developments in equipment and software are steadily increasing the scope of its practical applications. Datapro's recent survey of remote computing users, which is summarized in the Users' Ratings tables, indicates a high degree of user satisfaction with the overall effectiveness of the current commercial remote computing networks.

## All About Time-Sharing and Remote Computing Services

➤ Total revenues for commercial remote computing services, including both interactive time-sharing and remote batch processing, rose from just \$20 million in 1966 to an estimated \$1.2 billion in 1975, and the industry's revenues are currently growing at the rate of about 35 percent per year.

Until 1973, the leading supplier of remote computing services had long been General Electric Company, which entered the business in 1965 and has invested over \$150 million in developing an international network that serves the United States, Canada, and Western Europe. Two GE "super-centers" located in Cleveland and Maryland contain a total of more than 100 interconnected central processors and communications controllers. GE's "Mark III" service combines interactive time-sharing, remote batch processing, and network data management services that provide rapid access to centralized information files.

Control Data Corporation became the largest supplier of computing services in January 1973, when it acquired IBM's Service Bureau Corporation as part of the out-of-court settlement of its antitrust suit against IBM. With SBC's revenues added to those of its own Cybernet service, Control Data grossed more than \$100 million from computing services in 1974 and edged out GE for the industry leadership. It should be noted, however, that a significant portion of SBC's revenues are derived from conventional service bureau operations that do not involve communications links.

Other leading suppliers of remote computing services include Boeing Computer Services, Compu-Serv Network, Computer Sciences Corporation, Com-Share, Cyphernetics, McDonnell Douglas Automation Company, National CSS, On-Line Systems, Rapidata, Scientific Time Sharing Corporation, Tymshare, United Computing Systems, and University Computing Company. Each of these firms has made a multimillion-dollar investment in remote computing and offers a wide range of services over a broad geographical area. Not to be overlooked, however, are the dozens of smaller remote computing companies, which offer a wide choice of equipment, software, and services together with the possibility of more personalized attention to your specific needs.

### User Benefits

Commercial remote computing services offer numerous attractive benefits to their users. Some of these benefits, indeed, are so compelling that many companies with large inhouse computer systems of their own are also heavy users of commercial remote computing networks. Here are some of the principal reasons for using remote computing services.

- **Flexibility.** Remote computing enables you to buy only as much computing power as you need and (except for fixed terminal costs and minimum service charges) to pay only for what you use. Thus, you can effectively "stretch" or "shrink" the size of your

computer installation from day to day as your workload expands or decreases. You can use a remote computing service to handle the peak-period overloads on your in-house computer system. You can explore the possibilities of centralized data bases and management information systems at comparatively low costs and without any long-term commitments. What's more, you can deal simultaneously with two or more remote computing companies and take advantage of differences in their pricing structures, languages, and program libraries.

- **Ease of use.** In general, remote computing terminals are straightforward in operation and easy to learn and use. Programming languages such as BASIC, together with conversational-mode compilers and debugging aids, have made programming quite simple and fun to learn. The comparative simplicity of the terminals and their ease of operation have made interactive time-sharing an accepted mode of operation for numerous engineers and accountants who previously resisted all efforts to get them directly involved with computers.
- **Man/machine interaction.** Interactive time-sharing permits direct, instantaneous communication between humans and computers at affordable prices. Users can test and debug their programs as they write them, with the computer checking, guiding, and reassuring them at each step in the process. A similar dialog process between man and computer can greatly facilitate the solution of many engineering and scientific problems, and can provide managers with exactly the information they need for informed decision-making. What's more, time-sharing users can spend hours of "head-scratching" time at their terminals without holding up an expensive processor — although it should be noted that the terminal connect time usually costs from \$5 to \$15 an hour.
- **Fast turn-around.** Remote computing can greatly reduce the elapsed time between the submission of data to be processed and the delivery of the computed results. In the case of typical in-house batch computer systems, turn-around times usually range from several hours to several days. The remote computing user can simply sit down at his terminal, enter the data, initiate execution of the appropriate program, and get the results he needs, either at his terminal or on a suitable output device at the computer site, all with a minimum of delay.
- **Choice of languages.** Most remote computing suppliers offer a choice of several programming languages, making it quite feasible for each user within your organization to work with the language that best suits his problem and his background.
- **Application programs.** Most of the commercial remote computing companies are placing an ever-increasing emphasis upon the development of ready-made programs for specific applications. The availability of ➤

## All About Time-Sharing and Remote Computing Services

➤ suitable application programs can save you thousands of dollars in programming costs and get you "on the air" much sooner.

- *Networks and data bases.* A number of companies now offer nationwide communications networks that permit users scattered around the country to access a centralized data base. These services can permit your company to enjoy most of the advantages of a widespread on-line communications network with centralized files at a fraction of the cost of setting up and operating your own. (It should be noted, however, that considerations of communications reliability, access control, file security, and flexibility of the available data manipulation and retrieval languages become particularly important in this type of application.)
- *Dedicated services.* Dozens of companies are now offering remote computing systems dedicated to providing a specific type of service. These systems can be divided into two basic classes: those that provide specialized computational or data processing services, and those that provide access to a single central data base. Examples of the first class include dedicated systems for hospital accounting, automobile dealer accounting, text editing, and civil engineering computations. Probably the best-known services of the data base type are the stock quotation services, automated credit bureaus, and reservation systems.

### Possible Drawbacks

Despite the many advantages, remote computing can be a distinctly mixed blessing. Here are some potential disadvantages to be aware of:

- *Questionable reliability.* This question should be uppermost in the minds of prospective remote computing users: Just how reliable is the service? Many early time-sharing networks earned notorious reputations for being down (out of service) more than they were up. Fortunately, a great deal of progress has been made since those days. Only four percent of the respondents to Datapro's latest survey of remote computing users rated the reliability of the services they were using as poor. Most system "crashes" that occur nowadays are of short duration and are quickly followed by effective recovery procedures that minimize their impact upon users' operations.

Users of the commercial remote computing services are being plagued by fewer problems arising within the facilities of the telephone companies that provide the vital communications links between the computers and their users. The telephone companies, after being severely criticized for their failure to provide the quality of service required for reliable data communications, have made many improvements.

Overall, the reliability of the existing remote computing services is more than adequate for most applications of the computational variety. But companies contemplating the use of remote computing for business data processing, where important files must be stored and processed with minimal errors, should pay careful attention to the reliability aspect.

- *Slow input/output.* In some of the current remote computing networks, input and output speeds are still limited to the 10 to 15 characters-per-second rates of conventional typewriter-style terminals. These low speeds are more than adequate for many applications, but in other cases they impose a severe restriction on throughput. To overcome this limitation, many time-sharing services now support 30-cps interactive terminals, and some offer 120-cps interactive units and/or much faster remote batch terminals.
- *Low computational efficiency.* The complex software required to coordinate and control the operations of multi-user interactive time-sharing systems usually requires large amounts of central processor time and memory space. As a result, the computational efficiency of many of the current systems is very low. From the user's point of view, this poor efficiency may or may not be a matter of concern, depending upon the manner in which the central processor costs are allocated. Low computational efficiency is less likely to be a problem in remote batch processing systems because their control software requirements are less complex.
- *Questionable data security.* When multiple users share a computer system, challenging problems are encountered in safeguarding the confidentiality and integrity of each user's programs and data files. Most of the commercial remote computing services have paid a good deal of attention to this security problem, combining special access protection with passwords and a variety of other techniques. Prospective users of any remote computing system should make sure that the available security provisions will adequately protect their interests.
- *System loading problems.* In addition to down-time resulting from the reliability problems discussed above, a remote computing system may be unavailable when you need it because the system is "saturated." Saturation occurs when a remote computing system is being accessed by the maximum number of users it is capable of serving simultaneously. As the load on a system grows heavier, response times tend to increase, turn-around times get longer, and throughput drops. Finally, when saturation is reached, no more users can be served until someone completes his job and disconnects. Unfortunately, the heavy system loading conditions that are so frustrating for users often represent high-profit situations for the suppliers. Among the time-sharing users who responded to Datapro's recent survey, 4 percent judged the response time to be poor and 13 percent rated it only fair.

## All About Time-Sharing and Remote Computing Services



*Here's what goes on behind the scenes. This photo shows about half the magnetic tape units connected to the Univac 1108 computers in University Computing Company's Dallas operations center. UCC is a long-established supplier of remote batch processing services.*

- ● **High communications costs.** Unless you choose a remote computing company that offers "free" or fixed-cost local access in your area, communications costs can easily represent the largest component of your remote computing bill. One of the problems is that it is usually necessary to use standard voice-grade telephone lines, with a practical data-carrying capacity of 4800 bits per second or more, to transmit teletypewriter data at 110 bits per second. Needless to say, the user pays for this inefficiency. Prospective remote computing users should carefully investigate the communications costs they will encounter and make every reasonable effort to minimize them.
- **High data storage costs.** The costs associated with on-line storage of large data files at the remote computer center may rule out some applications that otherwise seem made to order for remote computing. Based on a typical monthly charge of \$0.50 per 1,000 characters stored, it would cost \$400 per month just to keep a file of 10,000 80-character records on-line. The cost of storing the programs to manipulate the file would further increase the user's monthly bill. (It should be noted, however, that many remote computing companies now offer on-line mass storage at prices well below the rate used in our example.)
- **Loss of control.** When interactive time-sharing terminals are installed in a company, their ease of use and undeniable appeal often lead to their utilization for many problems that could more economically be handled by a desk calculator, a slide rule, an in-house computer, or a conventional service bureau. As a result, the bill for remote computing services is likely to escalate beyond management's wildest dreams. Therefore, it's important to establish and enforce proper control procedures. But controlling the access to and utilization of multiple terminals can be considerably more difficult and frustrating than administering a centralized computer facility. It can help a lot if the

remote computing network requires each user to identify himself with a password and a department or project charge number.

- **Man/machine communication barriers.** A mundane but nonetheless important factor that militates against the dream of giving every manager and/or every engineer direct access to a central computer utility is the fact that most of these prospective users lack the typing skill that is now required for efficient man/machine communication. It is safe to predict that this problem will eventually be solved through the use of simplified keyboard layouts and through gradual development of the necessary keying skills. In addition, more direct input techniques, such as light pens and touch-sensitive display tubes, will receive increased development emphasis and wider usage.

### Scientific Applications

Scientific, engineering, educational, and other predominantly computational applications are the ones for which time-sharing computer systems were originally conceived and developed, and they still comprise the bulk of the workload for many of the commercial remote computing services. Users with problems of the computational type can take full advantage of most of the previously discussed advantages of remote computing: flexibility, ease of use, direct man/machine interaction, fast turn-around times, program libraries, etc.

Time-sharing computer systems, when properly utilized, can open up new dimensions in productivity, creativity, and job satisfaction for scientists, engineers, financial analysts, applied mathematicians, and many other professionals. Examples of specific applications have been documented in dozens of articles in the trade press during the past few years.

From the viewpoint of the remote computing suppliers, the only disappointing aspect of these computational-type

## All About Time-Sharing and Remote Computing Services

▷ applications has been the gradual realization that the total potential market for them is far smaller than the market for business data processing services. And remote computing has really only begun to tap the latter market.

### Business Applications

Just a few years ago, many observers of the EDP industry were predicting that the availability of remote computing services would quickly revolutionize the business world. One or more terminals in every business establishment, tied into a powerful central computer, would handle the company's bookkeeping, billing, payroll, inventory control, and many other vital functions — and do all this at an irresistibly low cost.

These predictions may yet come true, but it is now apparent that it's going to be a long, gradual process rather than a rapid revolution. The use of both interactive time-sharing and remote batch processing for business functions is growing steadily now, but the rate of acceptance has been well below the early predictions. The prognosticators apparently overlooked — or underestimated the impact of — four important factors.

First, a remote computer, like every other computer, must be *programmed* before it can solve anybody's problems. Few small business firms have employees capable of analyzing and programming their data processing requirements, and few have been willing to pay an outside firm thousands of dollars to write the programs they need. This means that suitable readymade application programs are a virtual necessity for any remote computing supplier vying for business data processing accounts — yet the suppliers were surprisingly slow to develop and offer such programs. There has, however, been significant recent progress in this area. As shown by the chart on the last two pages of this report, many of the remote computing companies now offer programs to handle accounts payable, accounts receivable, general ledger, payroll, inventory control, and other common business functions. Moreover, most of the suppliers offer programming services to tailor their "packaged" programs to the specific needs of each user.

Second, small businessmen tend to be quite conservative and set in their ways. Very few of them are anxious to plunge into the use of a new and unperfected technology. They tend to be understandably apprehensive about storing their vital, confidential files in a computer system that is located miles away and shared by many other simultaneous users. The remote computing suppliers are gradually learning how to answer the questions and dispel the doubts of these prospective customers, but their penetration of the huge business data processing market continues to be relatively slow.

Third, the previously discussed reliability problems have caused many companies to reject the use of remote computing for applications in which undetected errors and missed deadlines cannot be tolerated. Outright rejection

of remote computing on these grounds alone probably represents an unduly harsh judgement. In designing a remote computing application — as in any business data processing function — the systems analysts and programmers should attempt to anticipate every possible source of error and then incorporate appropriate controls and checks to detect and overcome these errors. When this is done, present commercial remote computing systems should be able to satisfy all reasonable requirements for reliability and security in data processing applications.

Fourth, the 10-character-per-second Teletypewriter input/output speeds of the early commercial time-sharing services made them unsuitable for any data processing function that involved large volumes of input and/or output data. In order to qualify for a broader range of business applications, many of the remote computing companies are now offering both faster typewriter-style terminals, with speeds in the 30-character-per-second range, and high-speed batch-mode terminals capable of reading cards and printing reports at 120 to 600 characters per second.

Thus, definite progress is being made toward overcoming the main obstacles against widespread use of commercial remote computing systems for business applications. Three other recent trends seem destined to help accelerate the swing toward remote computing for business data processing:

- The establishment of dedicated systems designed to satisfy the data processing requirements of specific types of businesses.
- The development of nationwide networks that enable users in many different locations to access a central data base. (The most impressive current examples are GE's international network, which is available by local telephone in over 400 cities in the U.S. and Canada and over 25 cities in Western Europe, and Tymshare's TYMNET, which uses more than 60 special communications processors and over 50,000 miles of leased Bell System lines.)
- The availability of a wide range of applications program from sources other than the remote computing companies themselves. A slow-starting but promising concept called "piggy-backing" involves the development of application programs by independent software firms and the marketing of these programs for operation on specific remote computing systems.

### What's Ahead in Remote Computing

The obvious advantages of remote access to large systems without the burdens of ownership or leasing will continue to attract new users, and current users will increase their spending as new applications are added. These factors will combine to produce the dramatic increase in usage expected over the next several years.





## All About Time-Sharing and Remote Computing Services

➤ On the basis of current trends and projections, it seems likely that the remote computing industry of the future will shape up this way:

- There will be several large, nationwide suppliers of remote computing services. These will be true "information utilities," offering a broad range of computational, information retrieval, and communications services to users throughout the country (and perhaps the world).
- The smaller remote computing companies that survive will generally do so by offering highly specialized services to specific types of business firms. Companies attempting to market plain "computing power" are finding it increasingly difficult to stay alive.
- Many current users of commercial remote computing services will install their own in-house computer systems. Some companies will install small computers (such as the IBM System/32, the IBM 5100, or the proliferating minicomputers from dozens of vendors) to replace individual time-sharing or remote batch terminals, while others will install full-barreled in-house time-sharing systems of their own. To make up for these lost customers and maintain their growth, the remote computing suppliers will have to keep on attracting new customers, primarily from the huge ranks of small business firms.
- Remote computing users will have an ever-growing variety of "packaged" application programs to choose from. These will be developed by both the remote computing companies and independent software firms. "Piggy-backing" of specialized services on existing remote computing networks will continue to increase.
- Finally, both suppliers and users will begin to take advantage of the fact that the nationwide remote computing networks can be used effectively for a broad range of communications functions, as well as for computation and information retrieval. The same remote computing system that satisfies a company's computational needs and holds its data files will also be able to handle its message transmission, data collection, report distribution, and other communications requirements.

When the remote computing companies offer this broad spectrum of services, and when a large number of business firms accept and use them on a daily basis, the age of the "information utility" will have arrived at long last. At the present time, however, remote computing users have to settle for less. The guidelines and comparison charts that follow will help prospective users to assess what's available today and how it can aid in solving their information processing problems.

### Surveying the Users

To evaluate the current level of user satisfaction with specific vendors of remote computing services and with

remote computing techniques in general, Datapro Research Corporation, in conjunction with the Association of Time-Sharing Users, Inc. (ATSU), designed and conducted an extensive user survey. Reader survey forms on Remote Computing Services were mailed to our subscribers with the February 1976 supplement to DATAPRO 70, and were also included in ATSU's February Newsletter to its members and associates. (For more details on ATSU, please address all inquiries to the association's headquarters address: 210 Fifth Avenue, New York, NY 10010.)

Qualified responses were received from 475 users of remote computing services in the United States and Canada. Many users commented upon their experiences with two or more vendors and services. The average number of companies mentioned was 1.56, reflecting a slight downward trend in the use of multiple vendors' services relative to last year's reported average of 1.74.

It should be noted that the DATAPRO 70 subscribers and ATSU members who responded to our survey may not necessarily constitute a completely representative sample of "typical" remote computing users. Furthermore, the small sample sizes for some of the listed companies may make it unwise to draw firm conclusions about relative company performance from the indicated ratings. However, Datapro believes the survey results that follow can be of considerable value to users, prospective users, and vendors of the commercial remote computing services, provided the preceding caveats are kept in mind.

Responding users were asked to rate each remote computing service they had used or were using by assigning a rating of Excellent, Good, Fair, or Poor to overall satisfaction, cost effectiveness, quality and availability of technical support, quality of sales personnel, training effectiveness, ease of use, manuals and documentation, applications packages, languages and compilers, reliability, and response time.

The individual user ratings earned by the 25 remote computing companies that were rated by 5 or more users are summarized in the accompanying Users' Ratings tables.

A "Weighted Average of All Ratings" was calculated for each company by assigning a value of 4 to each user rating of Excellent, 3 to Good, 2 to Fair, and 1 to Poor. Among the 15 companies whose services were rated by 10 or more users, the highest average ratings were earned by:

Company	Overall Rating	No. of Users
Scientific Time Sharing Corp.	3.33	17
On-Line Systems	3.21	12
The Service Bureau Co.	3.07	80
Cyphernetics	3.05	31

Highly regarded companies with fewer than 10 user responses included: ➤



## All About Time-Sharing and Remote Computing Services

### USERS' RATINGS OF REMOTE COMPUTING SERVICES

Company*	No. of User Replies	Weighted Average of All Ratings**	Users' Ratings**																											
			Overall Satisfaction				Cost Effectiveness				Response Time Adequacy				Reliability				Ease of Use (Inexperienced Users)				Ease of Use (Experienced Users)				Effectiveness of Training Aids			
			E	G	F	P	E	G	F	P	E	G	F	P	E	G	F	P	E	G	F	P	E	G	F	P	E	G	F	P
APL Services, Inc.	7	2.73	1	2	4	0	1	4	2	0	2	4	1	0	1	2	2	1	0	3	2	0	0	5	1	0	0	2	2	1
Boeing Computer Services, Inc.	19	2.75	3	12	3	1	0	6	10	3	5	11	3	0	4	9	4	2	1	5	11	1	5	11	12	1	8	4	3	
Compu-Serv Network, Inc.	24	3.04	5	14	5	0	5	11	5	2	7	15	2	0	9	13	2	0	5	12	5	2	12	8	2	1	0	9	10	1
Computer Sciences Corp.	40	3.02	13	22	4	1	7	24	8	1	13	18	7	2	12	19	8	1	9	15	10	4	22	13	3	0	2	24	8	2
Comshare, Inc.	23	2.85	2	16	5	0	2	8	11	1	4	16	3	0	6	13	3	1	1	10	7	4	7	12	2	0	2	10	5	2
Control Data Corp.	21	2.92	3	13	4	0	5	10	3	3	5	12	4	0	5	11	3	0	3	3	8	4	7	11	2	0	2	9	4	1
Cyphernetics	31	3.05	6	19	6	0	2	9	13	7	11	16	3	0	15	15	0	0	3	17	10	1	12	12	4	0	5	15	7	2
Data Resources, Inc.	5	2.60	0	4	1	0	0	1	4	0	0	1	4	0	0	2	2	1	0	3	2	0	1	3	1	0	0	3	0	0
First Data Corp.	6	3.18	3	3	0	0	4	2	1	0	2	4	0	0	2	4	0	0	1	2	2	0	4	1	0	0	0	0	5	0
General Electric Co.	134	3.00	28	78	21	6	13	66	44	8	55	63	11	2	58	57	13	2	22	80	22	5	64	54	8	1	19	71	26	4
Honeywell Information Systems	7	3.13	3	3	1	0	2	4	0	0	4	2	1	0	2	4	1	0	1	3	1	2	4	2	1	0	0	3	1	0
Interactive Data Corp.	6	2.75	0	4	2	0	1	2	3	0	3	2	0	1	2	3	1	0	0	1	3	2	2	3	1	0	1	2	2	1
Interactive Sciences Corp.	5	3.36	3	2	0	0	3	2	0	0	4	1	0	0	3	2	0	0	1	2	2	0	3	2	0	0	0	4	1	0
McDonnell Douglas Automation Co.	13	2.88	3	10	3	0	2	5	4	2	3	6	3	1	6	5	2	0	1	5	6	1	7	6	0	0	1	4	4	2
National CSS, Inc.	36	2.92	10	15	10	1	8	8	15	5	10	15	8	3	9	14	8	4	7	9	13	5	5	17	0	0	4	17	8	2
On-Line Systems	12	3.21	8	1	2	1	3	5	3	1	9	2	1	0	9	3	0	0	1	8	3	0	9	2	1	0	2	5	2	3
Rapidata, Inc.	15	2.70	1	7	6	1	1	6	5	3	3	8	1	2	2	10	1	1	1	8	3	1	1	9	4	0	1	4	5	2
Remote Computing Corp.	5	2.83	1	1	2	0	1	0	2	1	1	2	1	0	2	1	1	0	2	0	1	0	2	2	0	0	0	0	3	0
Scientific Time Sharing Corp.	17	3.33	7	8	1	0	7	6	3	0	11	6	0	0	10	7	0	0	4	6	4	2	8	7	1	0	5	10	0	0
The Service Bureau Co.	80	3.07	16	49	13	1	7	41	25	6	37	38	4	1	36	35	7	2	19	44	15	2	36	34	3	0	22	47	9	2
Standard Information Systems	6	3.25	3	3	0	0	2	3	1	0	0	3	1	1	2	2	0	2	2	2	0	0	3	3	0	0	2	3	1	0
Time Sharing Resources, Inc.	5	3.16	1	4	0	0	1	1	2	2	2	3	0	0	0	5	0	0	1	4	0	0	2	3	0	0	0	3	0	1
Tymshare, Inc.	46	2.96	8	30	6	2	5	18	14	9	8	23	11	4	18	17	7	4	13	13	16	4	18	23	3	2	7	15	16	2
United Computing Systems, Inc.	23	3.01	5	15	3	0	10	7	6	0	5	15	2	1	6	14	3	0	4	13	2	2	9	13	1	0	1	7	8	3
University Computing Co.	9	3.30	5	3	1	0	2	5	1	0	3	5	0	0	3	4	1	0	3	4	0	1	2	4	1	0	2	4	1	0
All others	131	2.85	31	66	23	11	40	45	31	14	48	57	16	11	36	65	22	8	20	48	43	13	55	56	15	2	11	40	38	23

\* Only the remote computing companies mentioned by five or more users are listed individually. The 57 companies rated by fewer than five users are combined in the "All others" entry.

\*\*Users' ratings are expressed in terms of number of user responses; the legend is E for Excellent, G for Good, F for Fair, and P for Poor. The "Weighted Average of All Ratings" was calculated by assigning a value of 4 to each Excellent rating, 3 to Good, 2 to Fair, and 1 to Poor.

Company	Overall Rating	No. of Users	Excellent	Good	Fair	Poor
Interactive Sciences Corp.	3.36	5	23%	50%	22%	5%
University Computing Co.	3.30	9	23%	48%	22%	5%
Standard Information Systems	3.25	6	34%	53%	11%	1%
First Data Corp.	3.18	6	36%	47%	13%	4%
Manuals and documentation			35%	48%	13%	1%
Application packages						
Language and compilers						
Reliability						
Response time adequacy						

The ratings assigned by all of the responding users can be combined to form the following overall picture of user satisfaction with the current remote computing services:

	Excellent	Good	Fair	Poor
Overall satisfaction	26%	56%	17%	3%
Cost-effectiveness	18%	41%	29%	11%
Technical support quality	31%	45%	20%	4%
Technical support availability	26%	41%	25%	7%
Sales personnel quality	26%	48%	19%	7%
Training effectiveness	14%	50%	27%	9%
Ease of use for experienced DP people	45%	46%	8%	1%
Ease of use for inexperienced or non-DP people	18%	46%	28%	8%

As you can see, the users made it quite clear that they were generally well pleased with the current services in terms of overall satisfaction, ease of use (for experienced or DP-oriented people), languages and compilers, reliability, and response time. At the same time, the users' overall ratings show plenty of room for improvement in the areas of cost-effectiveness, technical support, training, documentation, application packages, and ease of use for inexperienced users.

Determining the most popular communications terminals from the survey proved to be rather cumbersome due to the proliferation of terminals being used and the frequent use of more than one commercial service. Consequently, avoid bias in the results, Datapro categorized the communications terminal population by function only, resulting in the following data:

All About Time-Sharing and  
Remote Computing Services

## USERS' RATINGS OF REMOTE COMPUTING SERVICES (Continued)

Company*	No. of User Replies	Weighted Average of All Ratings**	Users' Ratings**																							
			Languages and Compilers				Application Packages				Manuals and Documentation				Availability of Technical Support				Quality of Technical Support				Quality of Sales Personnel			
			E	G	F	P	E	G	F	P	E	G	F	P	E	G	F	P	E	G	F	P	E	G	F	P
APL Series, Inc.	7	2.73	3	3	1	0	1	1	4	0	0	4	2	0	1	2	3	1	3	3	1	0	2	3	2	0
Boeing Computer Services, Inc.	19	2.75	9	5	3	1	4	7	5	1	2	12	5	0	5	9	4	1	5	9	5	0	3	12	4	0
Compu-Serv Network, Inc.	24	3.04	8	14	2	0	4	13	4	0	4	14	5	0	8	11	2	1	10	8	5	0	4	15	3	1
Computer Sciences Corp.	40	3.02	16	21	3	0	8	19	8	1	10	14	15	1	9	18	12	1	13	19	7	1	8	24	7	1
Comshare, Inc.	23	2.85	4	15	2	0	3	11	5	1	7	12	3	1	4	10	4	5	4	12	5	2	4	14	4	0
Control Data Corp.	21	2.92	7	11	1	0	6	9	2	1	3	14	4	0	2	6	12	1	3	13	5	0	4	14	1	2
Cyphernetics	31	3.05	5	19	5	0	8	14	8	0	14	12	5	0	12	11	8	0	11	13	7	0	9	22	0	0
Data Resources, Inc.	5	2.55	0	2	3	0	0	4	1	0	0	2	3	0	0	3	1	1	2	2	0	1	2	2	0	1
First Data	6	3.18	2	3	0	0	2	1	3	0	0	2	3	0	3	2	1	0	2	3	0	1	2	4	0	0
General Electric Co.	134	3.00	51	65	8	0	20	73	29	2	35	71	21	5	32	53	34	8	27	60	37	5	21	61	33	17
Honeywell Information Systems	7	3.13	4	2	1	0	2	2	3	0	1	3	2	1	4	2	0	0	4	2	0	0	2	2	0	1
Interactive Data Corp.	6	2.75	1	3	2	0	1	2	1	1	0	2	4	0	1	3	2	0	3	1	2	0	3	0	2	1
Interactive Sciences Corp.	5	3.36	3	2	0	0	1	3	0	0	0	4	1	0	2	3	0	0	4	1	0	0	0	5	0	0
McDonnell Douglas Automation Co.	13	2.88	7	3	2	0	4	5	2	1	5	3	4	1	2	5	3	3	2	7	3	1	5	2	4	2
National CSS, Inc.	36	2.92	14	16	1	3	12	15	6	1	11	17	7	0	8	13	13	2	12	18	5	1	7	21	4	4
On-Line Systems	12	3.21	7	3	2	0	6	4	2	0	4	4	3	1	4	5	3	0	6	4	2	0	5	4	2	1
Rapidata, Inc.	15	2.70	1	10	1	0	3	10	1	0	2	8	5	0	3	7	3	2	4	5	5	1	1	5	7	2
Remote Computing Corp.	5	2.83	2	1	0	0	0	2	2	0	0	1	1	2	0	2	1	1	2	1	1	0	2	0	2	0
Scientific Time Sharing Corp.	17	3.33	11	5	0	0	1	9	4	1	1	12	3	0	9	6	2	0	12	4	1	0	11	5	1	0
The Service Bureau Co.	80	3.07	17	45	11	3	19	37	17	2	27	38	9	6	22	36	16	5	24	38	14	4	29	30	15	6
Standard Information Systems	6	3.25	3	3	0	0	3	3	0	0	2	2	2	0	4	2	0	0	3	3	0	0	4	2	0	0
Time Sharing Resources, Inc.	5	3.16	3	1	1	0	0	3	1	0	1	3	1	0	4	0	1	0	5	0	0	0	0	4	0	1
Tymshare, Inc.	46	2.96	10	29	5	0	14	23	7	2	16	19	11	1	17	18	6	4	14	20	8	3	15	22	7	1
United Computing Systems, Inc.	23	3.01	8	10	4	0	6	10	5	0	4	14	3	2	8	8	5	2	10	8	4	1	4	12	5	1
University Computing Co.	9	3.30	3	2	1	0	5	4	0	0	4	4	0	0	2	6	0	0	5	3	0	0	4	2	1	1
All others	131	2.85	37	65	17	1	28	45	32	16	16	66	32	15	22	53	40	15	30	61	29	10	32	55	30	10

\* Only the remote computing companies mentioned by five or more users are listed individually. The 57 companies rated by fewer than five users are combined in the "All others" entry.

\*\*Users' ratings are expressed in terms of user responses; the legend is E for Excellent, G for Good, F for Fair, and P for Poor. The "Weighted Average of All Ratings" was calculated by assigning a value of 4 to each Excellent rating, 3 to Good, 2 to Fair, and 1 to Poor.

Terminal Type	No. of Terminals	% of Total	Language	No. of Users	% of Total
Interactive	1137	88	COBOL	98	21
Remote batch	159	12	APL	41	9
			Assembler	17	4
			PL/I	15	3
			MACRO	5	1
			RPG	1	—

Thus, the survey results clearly demonstrate that interactive terminals are still far more widely used than remote batch terminals for remote computing applications. The Teletype Model 33 continues to be the most popular terminal for remote computing use. However, other terminal manufacturers such as GE, Texas Instruments, and Univac are winning a significant market share.

The programming languages used by the survey respondents were as follows:

Language	No. of Users	% of Total
FORTRAN	354	75
BASIC	216	45

Thus, FORTRAN remains the clear leader in popularity, with BASIC and COBOL also boasting widespread acceptance among remote computing users. The survey respondents were using an average of 2.16 different programming languages each.

The remote computing applications reported by the survey respondents spanned virtually the entire spectrum of business and scientific applications. The leading applications cited included the following:

## All About Time-Sharing and Remote Computing Services

Application	No. of Users	% of Total	Type of Service Usage	No. of Responses	% of Total
Accounts payable	48	10	100% conversational	371	51
Accounts receivable	48	10	time-sharing		
Banking	16	3	Over 50% conversational	221	31
Billing	8	2	time-sharing		
Communications	4	1	Over 50% remote batch	96	13
Data base management	60	13	100% remote batch	37	5
Educational	11	2			
Engineering	78	16	<b>Length of Use</b>		<b>No. of Responses % of Total</b>
Financial	167	35			
General ledger	21	4	Under 6 months	61	8
Hospital administration	3	1	Under 2 years	215	30
Information retrieval	16	3	2 to 5 years	288	39
Insurance	17	4	Over 5 years	164	23
Inventory control	34	7			
Modeling	68	14	<b>Extent of Communications</b>		
Numerical control	2	—	<b>Network Required</b>	<b>No. of Responses</b>	<b>% of Total</b>
Operation research	3	1			
Payroll	21	4	Local only	416	58
Personnel	10	2	500-mile radius	66	9
Production	20	4	Nationwide	177	24
Project control	7	1	International	68	9
Sales analysis	4	1			
Scheduling	7	1	<b>Categories of users</b>		<b>No. of Users % of Total</b>
Scientific	27	6			
Simulation	28	6	Management	1,435	15
Statistical	83	17	Programmers	2,478	25
Text editing	6	1	Other data processing personnel	2,117	22
			All others	3,725	38

In addition to the information previously requested, this year's survey was expanded to cover other questions of possible interest to the industry. This data covers areas such as amounts spent monthly, changes in 1975-1976 usage, length of use, user categories, and proportional use of time-sharing/remote batch services. The results are summarized in the following tables.

Average Monthly Bill for Remote Computing Services	No. of Responses	% of Total
Below \$500	199	28
\$500 to \$2,000	239	34
\$2,000 to \$5,000	123	17
Over \$5,000	148	21

Changes in Use of Services During 1975	No. of Responses	% of Total
Increased	430	58
No change	161	22
Decreased	116	16
Stopped	27	4

Expected Changes in Use of Services during 1976	No. of Responses	% of Total
Increase likely	236	37
No change likely	218	34
Decrease likely	135	21
Will likely stop	49	8

### Selecting a Vendor

In most metropolitan areas of the United States and Canada, prospective remote computing users can choose from literally dozens of suppliers. Selecting the company that will provide you with the most effective service at the lowest overall cost isn't easy, but it can be done. What's needed is a straightforward, logical selection process that will guide you around the numerous pitfalls which await the unwary. The following procedure, if judiciously applied, will virtually assure the satisfaction of your remote computing requirements in a reliable, economical manner.

1. *Get all the help you can.* Remote computing is a complex, fast-changing field. Though the ultimate goal is to make life easier for computer users, selection of the most suitable commercial remote computing service requires consideration of complex and interrelated hardware, software, communications, and economic factors. Therefore, it's wise to learn as much as you can before making your choice. This report and other related material in DATAPRO 70 will help a lot. So will reading other articles and books, attending remote computing seminars, talking with various sales representatives, and studying their technical documentation. The services of an independent consulting firm with broad remote computing experience can also be well worth their cost.

## All About Time-Sharing and Remote Computing Services

- 2. *Define your requirements.* Before shopping for remote computing services, it's essential to know what you want them to do for you. Try to list all the reasonable applications for remote computing in your organization. Then rank these applications according to their relative importance and urgency. For each of the key applications, define the required computer functions — usually in terms of the inputs to be supplied, the calculations to be performed, the outputs to be produced, and their associated volumes. Specify the exact manner in which all computer inputs and outputs must interface with your existing procedures, forms, and/or data files, as well as any turn-around time requirements that must be met. Finally, determine the present overall cost of processing each application, so that you'll be in a position to know whether or not remote computing can really save you money.
3. *Survey the available remote computing services.* The first step in narrowing down the field is to find out which remote computing companies are actively marketing their services in your locality and collect the basic information about their capabilities, specialties, and pricing. The comparison charts in this report can help a lot. So can the Yellow Pages of your local telephone directory, the advertisements of the remote computing companies, and the experience of any acquaintances who are using remote computing. The salesmen for the various remote computing companies will usually be more than pleased to give you brief presentations describing their firms' capabilities and to present you with brochures, price schedules, and sample contract forms.
4. *Choose the most likely candidates.* Now it's time to reduce the list of contenders to the three to six that seem best able to meet your requirements. This can usually be accomplished by a selective "weeding out" process. You simply eliminate from consideration those suppliers that fail to measure up to one or more critical questions such as these:
- Are the company's services available in your area at a competitive cost (including all communication and terminal costs)?
  - Does the company offer the programming and technical support services you need?
  - Does the company offer the specific programming languages and/or application programs you need?
  - Does the company support the type of terminal equipment you need (or already own)?
  - Can the company satisfy the requirements, if any, for compatibility with your existing programs and/or data files?
  - Does the company appear to be able to meet your requirements for operational reliability and data security?
  - Are you satisfied that the company is soundly financed and in the business to stay?
5. *Learn all you can about each remaining candidate.* Now it's time to call in the sales representatives of each of the remaining contenders for in-depth discussions about their capabilities, services, and pricing. By now you'll have a good idea what questions to ask them — and what answers you're looking for. Be sure to find out exactly what each company offers in the way of equipment configuration, program library, programming services, training, documentation, security measures, contract terms, etc. Get the details of each company's pricing structure, including possible "extra" charges for programming, training, manuals, application programs, and other products and services you'll need. Be sure to ask for reference lists of current users. Contact these users, and learn all you can about what their experiences have been; it's likely to be a remarkably informative exercise. Also, check the results of the Datapro user survey on the preceding pages.
6. *Conduct benchmark tests.* This is probably the most important — and yet the most frequently ignored or misguided — phase of any remote computing selection project. The essence of benchmark testing is the actual preparation and execution of one or more problems which are representative of the user's planned computer workload. The purpose is three-fold:
- To find out exactly what's involved in using each supplier's services.
  - To determine the service availability, response time, and anticipated throughput that each supplier can deliver at both peak hours (usually around 10 to 11 a.m. and 3 to 4 p.m.) and off-peak times.
  - To determine the cost factors for each service on the types of problems you'll be running regularly.
- If you'll be writing your own programs, go ahead and prepare one or more of them, in the language of your choice. Then ask each of the prospective suppliers to loan you an appropriate terminal plus the computer time required to compile, test, and execute your programs. If you'll be using a ready-made application program supplied by the vendor,



## All About Time-Sharing and Remote Computing Services

▷ prepare some representative test data, borrow the necessary terminal, and give the program a real tryout. In either case, be sure to: (1) control all test conditions as carefully as you can; (2) make the benchmark programs and data as representative of your actual workload as time permits; (3) run each test at both peak and off-peak hours (and at the same times of day for all prospective suppliers); and (4) keep detailed records of all pertinent timing and cost data, as well as your impressions about the comparative ease or difficulty of using each service.

7. *Make your selection.* By now, you've amassed a great deal of pertinent information. Now it's time to "put it all together." From the results of your benchmark tests, calculate the estimated overall costs of satisfying all your remote computing needs with each supplier's services. Compare these costs with your present costs, and (if appropriate) with the estimated costs of alternative approaches such as a computer of your own or a conventional service bureau. In many cases, one of the remote computing suppliers will now stand out as a clear-cut choice. In others, it may be practical to contract with two or more suppliers and use the one whose offerings turn out to be the most economical for each of your applications.

If neither of the above solutions is appropriate, you may want to turn to some type of weighted point scoring system, in which each supplier is awarded an appropriate number of points for every desirable characteristic (such as availability, response time, languages, terminals, application programs, costs, etc.). But frankly, if it still looks like a really close race, we'd recommend giving preference to the company that made the best showing on your benchmark tests; there's no more convincing evidence than impressive performance on your own problems.

8. *Negotiate a suitable contract.* At this point, virtually every remote computing company will ask you to sign its standard contract form. But that's not necessarily your best move. There's a good chance the supplier will offer considerably more favorable contract terms if that's what it takes to land your account. So read the contract carefully. Make sure it clearly defines the company's pricing structure, charges for all additional products and services, hours of service availability, length of commitment, termination provisions, etc. If the supplier writes any programs for you, make sure it's clear whose property they will be. If you're not completely satisfied with the standard contract terms, ask the supplier to amend them.

You'll notice that most of the standard contracts disclaim any liability for damages arising either from the use of the suppliers' services or their failure to provide the agreed-upon services. If you feel you

need more protection, such as guaranteed file security, it certainly can't hurt to ask for it. Discussions with other customers of the service may be especially helpful in this area. And the advice of your company's lawyer is likely to be well worth having to help ensure that you'll get the services and the protection you need.

9. *Make periodic re-evaluations.* Once you've selected the most suitable remote computing service for your needs, it's unwise to assume that it will *continue* to represent your best choice. As a remote computing network becomes more heavily loaded, its performance tends to degrade. As the network's saturation point is approached, the response times to each user's requests are likely to become unbearably long. In addition to user frustration, this condition leads to longer connect times and higher costs. Therefore, it's wise to rerun your benchmark problems every month or two under the original test conditions. This will enable you to spot any deterioration in the service and present your supplier with documentary evidence of the fact. If the supplier cannot satisfy you that the original quality of service will soon be restored, remember that numerous other suppliers are anxious for your business. And, if you've written your own programs and used one of the common programming languages, it should be relatively easy to make the switch.

### The Comparison Charts

The principal characteristics of 104 commercially available services offered by 100 remote computing companies are presented in the accompanying comparison charts. Except where otherwise indicated, all information in the charts was furnished by the suppliers between November 1975 and March 1976; their responsiveness and cooperation with the Datapro Research staff is greatly appreciated.

Datapro sent repeated requests for information to approximately 140 companies known or believed to be in the remote computing business. The 100 usable responses summarized in our charts represent a comprehensive cross-section of the currently available commercial remote computing services in the U.S. and Canada. *The absence of any specific company from our charts means that the company either failed to respond to our repeated information requests or was unknown to us.*

The comparison chart entries and their significance to potential remote computing users are explained in the following paragraphs, together with additional useful guidelines for selecting the remote computing service that will most effectively meet your needs.

### General Information

*Name of service.* The name under which a company's commercial remote computing services are marketed may ▷



## All About Time-Sharing and Remote Computing Services

▷ or may not be the same as the corporate name. Where they differ, this entry indicates the name of the remote computing service. Some suppliers offer several different levels of service with different names and capabilities, and in these cases the chart entries differentiate between the various levels to the extent that space permits.

*Date operational.* This entry tells when each company's remote computing services first became available for regular commercial use. Most remote computing networks require lengthy shakedown periods before settling down to normal operations, so the length of time a service has been operational may serve as a reasonable indication of its reliability — as well as its financial stability. But it is also important to note that few remote computing networks remain really stable for long periods of time; disruptions can occur at any time through addition or consolidation of computer centers, changes in systems software, communications breakdowns, etc.

*Areas currently served.* Each remote computing company was asked to state the geographical areas it can service effectively, and their answers are reported in the charts. Where specific cities are named, the companies generally offer toll-free service in those cities through local computer centers, communications multiplexers, or foreign exchange facilities.

Where a company professes to serve a large region (such as "Eastern Seaboard and Mid-West"), the implication is that the company either offers INWATS (Inward Wide Area Telephone Service) or maintains computer centers, multiplexers, or other toll-free entry points in strategic cities throughout the area. Unfortunately, this is not true in all cases. It's wise to contact all the companies whose services appear to meet your needs, and find out exactly what communications and computational facilities they offer in your area.

### Equipment

*Computers.* This entry describes the number and type of central processors that each company currently employs in its remote computing network. The cities in which the computers are located are also indicated in most cases. The smaller supporting computers which are frequently used as communications processors or remote multiplexers are not listed here because of space limitations.

Space limitations have also precluded the reporting of configuration details such as main storage capacity, type and capacity of mass storage units, number and speed of central-site peripheral devices, etc. These configuration details may or may not be significant, depending upon your applications. Conventional scientific applications are typically coded in FORTRAN or BASIC, require little or no permanent file storage, and can be run without difficulty on most of the commercial remote computing systems. Conversely, many business data processing applications impose special requirements for mass storage



*Compudial is one of the many small time-sharing companies whose services are geared toward helping small businesses to perform such routine chores as order entry, invoicing, inventory control, and sales reporting on an immediate and efficient basis. Shown here is the GE TerminiNet 300 split-platen teleprinter which serves as the principal access unit to the Compudial system.*

units, central-site peripheral equipment, and compatibility with existing programs and data files. In these cases, it will be necessary to contact the remote computing vendors for details about their equipment configurations and capabilities.

*Number of simultaneous users.* This entry indicates the maximum number of users at remote terminals that each remote computing company claims to be able to serve simultaneously. This figure can serve as a useful — though far from precise — indication of the power of a remote computing system. The response time to each user's requests will naturally tend to increase as the number of simultaneous users gets larger, and in many cases an attempt to serve the indicated number of simultaneous users will lead to response times which are far too long for effective conversational-mode use.

*Conversational terminals supported.* The specific remote terminals that each remote computing system can accommodate for interactive, conversational-mode operations are listed in this entry. The abbreviation "TTY 33/35" stands for the Teletype Model 33 and Model 35 Teletype-writers, which are still by far the most widely used



## All About Time-Sharing and Remote Computing Services

▷ time-sharing terminals. These units have conventional typewriter-style keyboards and transmit an 11-unit ASCII code, usually at 110 bits per second. The Model 33 terminals are designed for "standard-duty" usage (up to about four hours a day) and are priced at about \$450 to \$1,300, depending on whether or not an integrated paper tape reader and punch and various options are included. The Model 35 terminals are functionally similar but are beefed up for heavy-duty usage, offer a broader range of options, and cost about three times as much as their Model 33 counterparts.

To capitalize upon the widespread acceptance of the Teletype Model 33 and 35 terminals, numerous peripheral equipment makers have introduced "Teletype-compatible" printers, display units, and other terminals which have the same interface characteristics and can utilize the same software support as the Teletype units. These Teletype-compatible terminals are described in the Peripherals section of DATAPRO 70. Examples include the GE TerminiNet 300 and 1200, Memorex 1200 Series, NCR 260, Texas Instruments Silent 700 Series, and UNIVAC DCT 500 terminals, plus CRT display terminals such as the Hazeltine Model 1000 and 2000 and the ITT 3501 Asciscop. In general, any Teletype-compatible terminal can be connected to any remote computing network that supports the Teletype Model 33 or 35 Teletypewriters — but it will generally not be possible to take advantage of the replacement terminal's higher speed and/or improved functional capabilities unless the remote computing company makes suitable modifications in its equipment and supporting software.

The IBM 2741 is another widely supported conversational-mode terminal. Built around an IBM Selectric Typewriter, it provides keyboard input and typed output in both upper and lower case. Its rated transmission speed is 134.5 bits (14.8 characters) per second. The 2741, however, cannot be equipped with paper tape I/O or any other medium for local storage of programs or data.

Typewriter-style terminals that are compatible with the IBM 2741 are marketed by Anderson Jacobson, Computer Devices, Harris, Memorex, Texas Instruments, and several other companies. All are described in the Peripherals section of DATAPRO 70. In addition to these and other typewriter terminals, many remote computing companies also support the use of CRT display units, digital plotters, and/or portable terminals.

Although many of the remote computing companies offer to supply and maintain the terminals which their systems support, you'll retain more flexibility if you obtain your terminals from the manufacturer or some other independent source. The Teletype terminals, for example, can be leased from the various telephone companies or from sources such as the RCA Service Company and Western Union Data Services.

*Batch terminals supported.* In addition to the low-speed, conversational-mode terminals which are usually

associated with time-sharing, many of the remote computing networks now support faster terminals designed for batch-mode transmission and reception of comparatively large volumes of data. Batch terminals greatly extend the spectrum of practical applications for remote computing systems by permitting the entry of previously recorded data and the printing of results at comparatively high speeds.

The most widely supported batch terminal has long been the IBM 2780 Data Transmission Terminal. Four models of the 2780 provide different combinations of card reading, card punching, and/or line printing capabilities, at transmission speeds ranging from 1200 to 4800 bits (150 to 600 characters) per second. Data is transmitted under IBM's Binary Synchronous Communications (BSC) line discipline technique in one of three codes: ASCII, EBCDIC, or Six-Bit Transcode. Rental prices for the 2780 range from about \$700 to \$1,300 per month, so its installation must be carefully justified by virtue of a real need for the faster input/output speeds it provides.

As in the case of the Teletype terminals, the widespread acceptance of the IBM 2780 has led to the introduction of competitive terminals which offer functional compatibility with the 2780, usually at lower prices. Numerous "intelligent" (programmable) terminals, such as those produced by Control Data, Data 100, Harris, and Mohawk, can emulate the functions of the IBM 2780 and other popular batch terminals. And IBM itself has largely superseded the 2780 in favor of a pair of newer terminals, the 2922 and 3780, which perform the same functions as the 2780 at substantially higher speeds. Multifunction remote batch terminals (RBT's), from companies such as Digital Equipment and Data General, offer 2780 emulation plus the capability to perform a multitude of other applications and functions, some simultaneously.

Many of the remote computing companies also support the use of small digital computers, such as the Honeywell (nee GE) 105, IBM 1130, IBM System/360 Model 20, and UNIVAC 9200, as remote batch terminals. These independently programmed computers can serve as "intelligent terminals," processing some data locally and providing great flexibility in their communications functions. Their costs, as might be expected, are comparatively high.

All the terminals mentioned above are described in detail in the Peripherals or Computers section of DATAPRO 70; please refer to the Index, beginning on page 70A-100-01a. Minicomputers are covered in the DATAPRO 70 feature report *All About Minicomputers*, 70C-010-020.

### Software

*Conversational programming languages.* This entry lists the programming languages offered by each company for interactive use by customers at remote terminals. The term "conversational" implies a high degree of interaction between the programmer and the computer system throughout the program entry and debugging process. ▷

## All About Time-Sharing and Remote Computing Services

➤ In most cases, each statement of the source-language program is checked for proper syntax as the user enters it, and any necessary corrections can be made immediately. After the whole program has been entered and checked, one of two basic techniques is usually followed to get it into operation: the program may either be compiled into a machine-language object program and then executed in conventional fashion, or it may be executed immediately in an interpretive mode. Interpretive execution saves compilation time and facilitates program changes, but it also requires that each source-language statement be translated into the appropriate machine instructions every time it is executed — an inherently inefficient process.

FORTRAN and BASIC are by far the most popular conversational programming languages for remote computing use. Between the two, experienced computer users tend to favor FORTRAN because of its greater power and flexibility, while first-time users often choose BASIC because it is generally considered easier to learn and use.

FORTRAN has been most widely used scientific programming language for more than a decade. It uses symbols and expressions similar to those of algebra to express the procedures for performing computational and logical processes. Though it was designed strictly for scientific applications, FORTRAN has been successfully used for a wide range of business data processing functions as well. There are many different versions of the FORTRAN language, but conversions of FORTRAN programs from one version to another can usually be made with comparatively little difficulty. Thus, programs which are prepared and debugged in conversational mode can later be converted into efficient production programs through recompilation by a batch-mode compiler.

BASIC (Beginners' All-purpose Symbolic Instruction Code) was developed at Dartmouth College to provide nonprogrammers with the capability to write programs in an easy-to-use language that resembles standard mathematical notation. BASIC is well suited for use in conversational-mode programming and debugging, and has rapidly gained wide acceptance among suppliers and users of remote computing services. Like FORTRAN, BASIC was designed for scientific and mathematical programming but has also been successfully used for business data processing. Many of the remote computing companies offer extended "supersets" of the BASIC language which considerably increase its capabilities. (Note, however, that the use of these extended language facilities in your programs may effectively cause you to become "locked in" to the particular company that offers them.) Most of the existing BASIC compilers emphasize rapid compilation and ease of use rather than efficiency of object-program execution; efficient batch-mode compilers for the BASIC language are rare.

APL is a comparatively recent and noteworthy arrival on the remote computing language scene. Conceived in the early 1960's by Dr. Kenneth E. Iverson of IBM, APL was

designed to permit clear, concise expression of computational algorithms. APL's proponents claim (with some justification) that it is "more powerful than FORTRAN and easier to learn than BASIC." APL uses a much larger set of symbols and operators and a considerably different syntax than either FORTRAN or BASIC. Its facilities for handling vectors and arrays are especially powerful, yet simple to use. Some of the commercial implementations of APL include file-handling and formatting facilities that make them quite effective for business as well as scientific applications. The conciseness of the language, however, is a mixed blessing in that it often makes APL programs hard to read and comprehend. Moreover, most of the current implementations of APL are interpreters, which means that the efficiency of object-program execution is likely to be comparatively low.

Though COBOL is by far the most widely used programming language for business applications, comparatively few companies offer a true conversational-mode COBOL compiler. Nonetheless, COBOL's dominance in batch-mode business data processing made it the third most widely used language in Datapro's latest survey of remote computing users.

Other general-purpose languages offered in conversational implementations include ALGOL, CAL, JOVIAL, and PL/1, together with a variety of symbolic assembly languages. In addition, many of the remote computing companies offer special-purpose languages designed for specialized functions such as list processing (e.g., LISP and SNOBOL), text editing, and program debugging.

*Batch-mode programming languages.* The languages offered by each remote computing company for batch-mode (i.e., non-interactive) compilation are listed in this entry. In general, the batch-mode language processors place a considerably greater emphasis upon the generation of efficient object programs than do their conversational-mode counterparts. Therefore, their use can lead to substantial savings in computer time for "production" programs which are run on a regular basis. Batch-mode compilers for virtually every programming language currently in use are offered by one or more of the remote computing companies. By far the most popular languages for batch-mode use are FORTRAN for scientific applications and COBOL for business data processing.

*Principal applications.* For most remote computing users, the range and capabilities of the available application programs rank among the most important factors in choosing a particular supplier. Thousands of dollars worth of programming efforts can often be saved through the use of suitable ready-made programs, and many of the remote computing companies now offer a broad spectrum of programs to choose from.

Because of space limitations, the main comparison charts show only the principal application areas supported by each company — and the entry "business & scientific" is used for the many suppliers that offer hardware and ➤

## All About Time-Sharing and Remote Computing Services

➤ software designed to support both commercial and scientific applications. The special chart on the last two pages of this report shows which of 25 important classes of application programs are available from each of the remote computing companies.

### Charges

One of the most complex and confusing aspects of the current remote computing scene is the pricing of the services. There has been no general agreement to date as to the best technique for accounting and charging for the system resources used by each customer. As a result, prospective users are confronted by a bewildering array of rate schedules. The diverse pricing policies make cost comparisons very difficult and accentuate the desirability of benchmark testing.

Some remote computing companies impose no minimum monthly charge, while a few charge *only* a single, all-inclusive monthly service fee, and a number of companies offering specialized services bill their customers on a per-transaction or per-item basis. Most companies bill the user for each second of central processor time, while others include the processor time as part of the terminal connect charge. Some companies provide each user with a certain amount of "free" mass storage space, while others do not. Some companies impose a one-time charge for initiation of service, and some have special pricing schedules for certain application programs. In addition, there are usually separate charges for the use of central-site peripheral devices (such as card readers and printers), for punched cards and printer forms, and for extra programming manuals and training courses.

The principal pricing elements for each remote computing company, in both the interactive and remote batch modes, are summarized in the comparison chart entries under the "Charges" heading. The indicated rates are for prime-time use. Many suppliers offer lower rates during non-prime hours, and discounts for volume usage are common. Remember that in addition to the charges listed in the charts, users must bear the cost of their terminals, modems, and communications facilities.

**Minimum monthly charge.** This is the minimum charge, if any, that is imposed for each month of remote computing service. (The companies that impose no minimum charge will naturally be of particular interest to users who plan to deal simultaneously with several different suppliers.)

**Terminal connect time.** This entry shows the charge for each hour of time during which an interactive or remote batch terminal is "on-line" (i.e., connected to the central computer).

**Central processor time.** Most remote computing companies impose a specific charge for each minute (or second) of time during which the central processor is working on the user's program. In some cases, this charge varies with the amount of main memory occupied by the

program. Other companies allocate their central processor charges on the basis of more complex units with names like "Core Unit" or "Computer Resource Unit." Typically, such units are functions of the amount of processor time, main memory space, and input/output activity required by each program.

**Mass storage.** Virtually every remote computing company has large-capacity disk or drum units at its computer site. Users can rent as much of this mass storage space as they need for on-line storage of programs and files, at the rates indicated in this entry. The storage space is usually rented in units of one track or sector, whose capacity depends upon the physical format of the available mass storage device. Storage charges may be computed on the basis of either the average or maximum amount of storage used during each month; it's important to find out which basis your prospective suppliers use. Discounts are frequently granted for large-volume storage requirements.

### Comments

This final entry on the comparison charts is used to explain or amplify the preceding entries and/or to provide other pertinent information about each company's services.

### Remote Computing Suppliers

Listed below, for your convenience in obtaining additional information, are the headquarters addresses and telephone numbers of the 100 remote computing companies whose services are described in the comparison charts.

ACTS Computing Corporation, 29200 Southfield Road, Southfield, Michigan 48076. Telephone (313) 557-6800.

Aeronutronic Ford (formerly Philco-Ford Corp.), Computer Services Network, Union Meeting Road, Blue Bell, Pennsylvania 19422. Telephone (215) CH 8-2334.

APL Services, Inc., 684 Whitehead Road, Trenton, New Jersey 08638. Telephone (609) 883-0050.

Applied Computer Timesharing, Box 10188, Denver, Colorado 80210. Telephone (303) 771-0476.

Applied Logic Corporation, 900 State Road, Princeton, New Jersey 08540. Telephone (609) 924-7800.

Aquila BST (1974) Ltée/Ltd., C.P. 10 Tour de la Bourse, Montreal, Quebec H4Z 1A4. Telephone (514) 866-5841.

Beloit Computer Center, Inc., 423 State Street, Beloit, Wisconsin 53511. Telephone (608) 365-2206.

Boeing Computer Services, Inc., Eastern District, 7598 Colshire Drive, McLean, Virginia 22101. Telephone (703) 356-6900.

Bowne Time Sharing, Inc., 345 Hudson Street, New York, New York 10014. Telephone (212) 741-4700.

Chi Corporation, 11000 Cedar Avenue, Cleveland, Ohio 44106. Telephone (216) 229-6400.

## All About Time-Sharing and Remote Computing Services

- *Community Computer Corporation*, 185 West Schoolhouse Lane, Philadelphia, Pennsylvania 19144. Telephone (215) 849-1200.
- ✓ *Compudial, Inc.*, 21 Olney Avenue, Cherry Hill, New Jersey 08005. Telephone (609) 424-4700.
- Compu-Serv Network, Inc.*, (Ilex Corporate Group), 5000 Arlington Centre Boulevard, Columbus, Ohio 43220. Telephone (614) 457-8600.
- *Computel Systems Limited*, 1200 St. Lawrence Boulevard, Ottawa, Ontario K1K 3B8. Telephone (613) 746-4353.
- The Computer Company, Inc.*, 1905 Westmoreland Street, Richmond, Virginia 23230. Telephone (804) 358-2171.
- ✓ *Computer Innovations*, 70 West Hubbard Street, Chicago, Illinois 60610. Telephone (312) 329-1561.
- Computer Network Corporation (Comnet)*, 5185 MacArthur Boulevard, Washington, D.C. 20016. Telephone (202) 244-1900.
- *Computer Research Company*, 200 North Michigan Avenue, Chicago, Illinois 60601. Telephone (312) 346-1331.
- *Computer Resource Services, Inc.*, 1600 West Camelback Road, Suite 1F, Phoenix, Arizona 85015. Telephone (602) 242-9121.
- *Computer Sciences Canada, Ltd. (Infonet)*, Room 367, Place du Canada, Montreal 101, Quebec. Telephone (514) 878-9811.
- Computer Sciences Corporation*, 650 North Sepulveda, El Segundo, California 90245. Telephone (213) 678-0311.
- *Computer Sharing Services, Inc.*, 2498 West Second Avenue, Denver, Colorado 80223. Telephone (303) 934-2381.
- Computility Division, Call Data Systems, Inc.*, 31 Tremont Street, Boston, Massachusetts 02111. Telephone (617) 423-6780.
- ✓ *Computone Systems, Inc.*, 361 East Paces Ferry Road N.E., Atlanta, Georgia 30305. Telephone (404) 261-0070.
- Comshare, Incorporated*, P.O. Box 1588, Ann Arbor, Michigan 48106. Telephone (313) 994-4800.
- Comshare Limited*, 41 Voyager Court North, Rexdale, Ontario. Telephone (416) 678-1363.
- Control Data Corporation*, Cybernet Services, P.O. Box 0, Minneapolis, Minnesota 55440. Telephone (612) 853-8100.
- *Cybershare Ltd.*, 550 Berry Street, Winnipeg, Manitoba R3H 0R9. Telephone (204) 786-5831.
- Cyphernetics Division (ADP Network Services, Inc.)*, 175 Jackson Plaza, Ann Arbor, Michigan 48106. Telephone (313) 769-6800.
- Data Resources Inc.*, 29 Hartwell Avenue, Lexington, Massachusetts 02173. Telephone (617) 369-7853.
- ✓ *Data-Tek Corporation*, 1211 Chestnut Street, Philadelphia, Pennsylvania 19106. Telephone (215) 564-4133.
- *Datacrown Limited*, 650 McNicoll Avenue, Willowdale, Ontario. Telephone (416) 499-1012.
- *Dataline Systems Limited*, 175 Bedford Road, Toronto, Ontario. Telephone (416) 964-9515.
- ✓ *Datalogics, Inc.*, 11001 Cedar Avenue, Cleveland, Ohio 44106. Telephone (216) 721-9035.
- ✓ *Dialcom, Inc.*, 1104 Spring Street, Silver Spring, Maryland 20910. Telephone (301) 588-1572.
- *Distronics, Inc.* (Western Union Information Systems Division), 1060 Kings Highway, Cherry Hill, New Jersey 08002. Telephone (609) 667-6233.
- *Financial Data Systems, Inc.*, 6680 Chippewa, St. Louis, Missouri 63109. Telephone (314) 832-4150.
- First Data Corporation*, 400 Totten Pond Road, Waltham, Massachusetts 02154. Telephone (617) 890-6701.
- *Fulton National Bank*, 55 Marietta Street, Atlanta, Georgia 30302. Telephone (404) 577-3500.
- General Electric Company*, Information Services Business Division, 7735 Old Georgetown Road, Bethesda, Maryland 20014. Telephone (301) 340-4000.
- ✓ *Genesee Computer Center, Inc.*, 20 University Avenue, Rochester, New York 14605. Telephone (716) 232-7050.
- Grumman Data Systems*, 20 Crossways Park North, Woodbury, New York 11797. Telephone (516) 575-3284.
- *GTE Data Services Incorporated*, First Financial Tower, P.O. Box 1548, Tampa, Florida 33601. Telephone (813) 224-3559.
- ✓ *HDR Systems, Inc.*, 8404 Indian Hills Drive, Omaha, Nebraska 68114. Telephone (402) 399-1400.
- *Honeywell Information Systems, Inc.*, 2701 Fourth Avenue South, Minneapolis, Minnesota 55408. Telephone (612) 870-5200.
- Information Systems Design, Inc.*, 3205 Coronado Drive, Santa Clara, California 95051. Telephone (408) 249-8100.
- Interactive Data Corporation*, 486 Totten Pond Road, Waltham, Massachusetts 02154. Telephone (617) 890-1234.
- ✓ *Interactive Sciences Corporation*, 60 Brooks Drive, Braintree, Massachusetts 02184. Telephone (617) 848-2660.
- International Timesharing Corporation*, I T S Building, Jonathon Industrex, Chaska, Minnesota 55318. Telephone (612) 448-3061.
- ✓ *Itel Corporation*, 3 Corporation Park Drive, White Plains New York 10604. Telephone (914) 694-8800.
- ✓ *Kaman Aerospace Corporation*, Old Windsor Road, Bloomfield, Connecticut 06002. Telephone (203) 242-4461.
- Keydata Canada*, 74 Victoria Street, Toronto, Ontario. Telephone (416) 443-6800.
- *Keydata Corporation*, 108 Water Street, Watertown, Massachusetts 02172. Telephone (617) 924-1200.
- Leasco Response Incorporated*, 20030 Century Boulevard, Germantown, Maryland 20767. Telephone (301) 428-0500.
- ✓ *Management Systems Corporation*, 125 North State Street, Salt Lake City, Utah 84103. Telephone (801) 531-1122.
- ✓ *Manufacturing Data Systems, Inc.*, 320 North Main Street, Ann Arbor, Michigan 48104. Telephone (313) 761-7750.
- Mark/Ops*, Division of Northeastern Systems Associates, Inc., 475 Commonwealth Avenue, Boston, Massachusetts 02215. Telephone (617) 266-1930.
- ✓ *Martin Marietta Data Systems*, 300 East Joppa Road, Towson, Maryland 21204. Telephone (301) 823-1600.
- McDonnell Douglas Automation Company*, P.O. Box 516, St. Louis, Missouri 63166. Telephone (314) 232-4640.

## All About Time-Sharing and Remote Computing Services

- ✓ *Mellonics Information Center*, Litton Systems, Inc., 6701 Variel Avenue, Canoga Park, California 91303. Telephone (213) 887-5100.
- ✓ *Metridata Computing, Inc.*, P.O. Box 21099, Louisville, Kentucky 40221. Telephone (502) 361-7161.
- Multiple Access Limited*, 885 Don Mills Road, Don Mills, Ontario. Telephone (416) 443-3900.
- National CSS, Inc.*, 300 Westport Avenue, Norwalk, Connecticut 06581. Telephone (203) 853-7200.
- Newfoundland and Labrador Computer Service*, P.O. Box 9308, St. John's, Newfoundland.
- NLT Computer Services Corporation*, Distributor Services Division, 1777 Walton Road, Blue Bell, Pennsylvania 19422. Telephone (215) 542-8300.
- ✓ *Ohio Valley Data Control, Inc.*, 2505 Washington Boulevard, Belpre, Ohio 45714. Telephone (614) 423-9501.
- On-Line Business Systems, Inc.*, One Embarcadero Center, San Francisco, California 94111. Telephone (415) 391-9555.
- On-Line Systems, Inc.*, 115 Evergreen Heights Drive, Pittsburgh, Pennsylvania 15229. Telephone (415) 931-7600.
- Pacific Applied Systems Division*, System Development Corporation, 4835 Van Nuys Boulevard, Suite 108, Sherman Oaks, California 91403. Telephone (213) 829-7511.
- Paden Data Systems, Inc.*, 5838 Live Oak, Dallas, Texas 75214. Telephone (214) 823-3773.
- Polycom Systems Limited*, 133 Wynford Drive, Don Mills, Ontario. Telephone (416) 449-3400.
- PRC Computer Center, Inc.*, 7670 Old Springhouse Road, McLean, Virginia 22101. Telephone (703) 893-4880.
- Programs & Analysis, Inc.*, 21 Ray Avenue, Burlington, Massachusetts 01803. Telephone (617) 272-7723.
- Proprietary Computer Systems, Inc.*, 16625 Saticoy Street, Van Nuys, California 91406. Telephone (213) 781-8221.
- Pryor Corporation*, 400 North Michigan Avenue, Chicago, Illinois 60611. Telephone (312) 644-5650.
- Rapidata, Inc.*, 20 New Dutch Lane, Fairfield, New Jersey 07006. Telephone (201) 227-0035.
- Remote Computing Corporation*, 1076 East Meadow Circle, Palo Alto, California 94303. Telephone (415) 328-5230.
- ✓ *Scientific Process & Research, Inc.*, 24 North Third Avenue, Highland Park, New Jersey 08904. Telephone (201) 846-3477.
- Scientific Time Sharing Corporation*, 7316 Wisconsin Avenue, Bethesda, Maryland 20014. Telephone (301) 657-8220.
- The Service Bureau Company*, 500 West Putnam Avenue, Greenwich, Connecticut 06830. Telephone (203) 622-2000.
- ✓ *Shared Medical Systems, Inc. (SMS)*, 650 Park Avenue, King of Prussia, Pennsylvania 19406. Telephone (215) 265-7600.
- I.P. Sharp Associates Limited*, Suite 1400, 145 King Street West, Toronto, Ontario. Telephone (416) 364-5361.
- A.O. Smith Corporation*, 16363 Ryerson Road, New Berlin, Wisconsin 53151. Telephone (414) 447-4472.
- Standard Information Systems, Inc.*, 36 Washington Street, Wellesley Hills, Massachusetts 02181. Telephone (617) 237-2910.
- ✓ *Statistical Tabulating Corporation*, 2 North Riverside Plaza, Chicago, Illinois 60606. Telephone (312) 346-7300.
- Structural Dynamics Research Corporation*, 5729 Dragon Way, Cincinnati, Ohio 45227. Telephone (513) 272-1100.
- ✓ *Systems Dimensions Limited*, 770 Brookfield Road, Ottawa, Ontario K1V 6J5. Telephone (613) 731-6910.
- ✓ *Technical Advisors, Inc.*, 4455 Fletcher Street, Wayne, Michigan 48184. Telephone (313) 722-5010.
- Technology for Information Management, Inc.*, 1654 Central Avenue, Albany, New York 12205. Telephone (518) 869-0928.
- ✓ *Tel-A-Data, Inc.*, 1500 Northwest 167th Street, Miami, Florida 33169. Telephone (305) 625-8266.
- ✓ *Telstat Systems, Inc.*, 150 East 58th Street, New York, New York 10022. Telephone (212) 826-0640.
- Time Sharing Resources, Inc.*, 777 Northern Boulevard, Great Neck, New York 11022. Telephone (516) 487-0101.
- Tymshare, Inc.*, 10340 Bubb Road, Cupertino, California 95014. Telephone (408) 257-6550.
- ✓ *Uni-Coll*, 3401 Science Center, Philadelphia, Pennsylvania 19104. Telephone (215) EV 7-3890.
- United Computing Systems, Inc.*, 2525 Washington, Kansas City, Missouri 64108. Telephone (816) 221-9700.
- University Computing Company*, 7720 Stemmons Freeway, P.O. Box 47911, Dallas, Texas 75247. Telephone (214) 637-5010.
- ✓ *USS Engineers and Consultants, Inc.*, 600 Grant Street, Pittsburgh, Pennsylvania 15230. Telephone (412) 433-6515.
- ✓ *Wang Computer Services*, Division of Wang Laboratories, Inc., 836 North Street, Tewksbury, Massachusetts 01876. Telephone (617) 837-4111.
- ✓ *Westinghouse Tele-Computer Systems Corporation*, 2040 Ardmore Boulevard, Pittsburgh, Pennsylvania 15221. Telephone (412) 256-7799.
- Xerox Computer Services*, 5310 Beethoven Street, Los Angeles, California 90066. Telephone (213) 390-3461. □

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All About Time-Sharing and  
Remote Computing Services

COMPANY	ACTS Computing Corporation	Aeronutronic Ford Computer Services Network	APL Services, Inc.	Applied Computer Timesharing	Applied Data Processing, Inc.
<b>GENERAL</b>					
Name of service	ACTS RJE and Timesharing	Computer Services Network (CSN)	Action/APL.SV	—	Resource/100
Date operational	Feb. 1969	Dec. 1968	July 1970	Dec. 1967	Aug. 1974
Areas currently served	Michigan, Ohio, Illinois & Midwest New York, L.A., Oklahoma, Florida, Georgia & Southeast	Middle Atlantic States, Detroit, Los Angeles	U.S., Canada, France, Belgium, Switzerland	Nationwide access through United Computing Systems network	Connecticut, New York, Massachusetts, Rhode Island
<b>EQUIPMENT</b>					
Computers	Honeywell 440 (2) in Detroit; Honeywell 430 (2) and 440 in Daytona; IBM 370/155 (2) in Grand Rapids	Burroughs B 6700	IBM 370/155	See United Computing Systems entry	IBM 360/50 in North Haven, Conn.
No. of simultaneous users	240 total on Honeywell systems	96	140	Not specified	3 processing & 12 spooling
Conversational terminals supported	Any 10, 15, 30, or 120 cps terminal using ASCII, BCD, EBCDIC, or Correspondence Code	ASCII terminals up to 1200 bps	All 10, 15, and 30 cps; ASCII, BCD, and Correspondence codes	TTY & compatible terminals at 10, 30, or 120 cps	—
Batch terminals supported	IBM 2770, 2780, 2922, 3780, 360/20, System/3; Data 100 Models 70, 74, 78	Burroughs DC 1000 and B 700; IBM 2780 and compatible units	IBM 2780 and compatible emulated units	Data 100, IBM 2770	Four-Phase IV-40 Intelligent Remote Batch Terminal
<b>SOFTWARE</b>					
Conversational programming languages	FORTRAN, BASIC, PDP-8 Assembler	COBOL, FORTRAN, ALGOL, BASIC	APL	—	—
Batch-mode programming languages	FORTRAN, COBOL, PL/1, RPG	COBOL, FORTRAN, ALGOL, BASIC	SPSS service through APL-interactive/RJE	—	COBOL
Principal applications	Business & scientific	Business & scientific	Business & scientific	Contract construction industry	Business
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	\$100	None	\$100	None	—
Remote batch	\$250	None	—	—	\$500
Terminal connect time:					
Interactive	\$10-15/hr.	\$9/hr. (to 300 bps)	\$10-15/hr.	See Comments	—
Remote batch	None	\$25/hr. (over 300 bps)	—	—	\$8.64/hr.
Central processor time:					
Interactive	\$0.06/CPU Unit	\$0.24/sec.	\$24/min.	See Comments	—
Remote batch	\$250/hr.	\$0.24/sec.	—	—	\$4.41/min.
Mass storage:					
Interactive	\$1.00/1000 chars./month	\$0.50/1000 char (1 MB) \$0.25/1000 char (1-5)	\$10/million bytes/day	\$0.40/1000 chars./month	—
Remote batch	\$0.50/cylinder/month	\$0.10/1000 char. (> 5 MB)	—	—	\$0.06/1000 chars./month
<b>COMMENTS</b>					
	Subsidiary of Lear Siegler, Inc.; reduced rates for non-prime time; remote Job Entry service uses HASP Multileaving	Bulk storage and dedicated lines are available at large discounts; formerly Philco-Ford Corp. CSN	Offers shared files and data base applications, specialized data bases, RJE; a subsidiary of The Computer Company	Offers application programs for the contract construction industry only; charges are based upon transactions	Offers "intelligent" remote batch processing of business applications; a subsidiary of Computer Databanks



## All About Time-Sharing and Remote Computing Services

COMPANY	Applied Logic Corporation	Aquila BST Limited	Beloit Computer Center, Inc.	Boeing Computer Services, Inc.	Boeing Computer Services, Inc.
<b>GENERAL</b> Name of service	AL/COM	HASP RJE	AXSIM and BCC/RJE	Mainstream-CTS	Mainstream-TSO
Date operational	1967	Sept. 1972	Nov. 1969	May 1970	Feb. 1973
Areas currently served	Toll-free access in 19 states in the East and Mid-West; service centers in 4 cities	Canada	Wisconsin, Illinois, Tennessee, Minnesota, Connecticut, New York, Washington DC, Maryland	Continental U.S. and Canada via nationwide data network and communication system; also Great Britain	Continental U.S. and Canada via nationwide data network and communication system; also Great Britain
<b>EQUIPMENT</b> Computers	DEC PDP-10 (6) in Princeton, N.J.	Honeywell 2050, 1015, & 200 in Montreal; also RCA 45 & 46	IBM 360/65 in Beloit, Wisc.	IBM 370/168 in McLean, Va.	IBM 370/168 in McLean, Va.
No. of simultaneous users	150	6 (H 2050)	64	150	80
Conversational terminals supported	Any ASCII terminal at 10 or 30 cps	—	Any ASCII or Correspondence terminal at 15 or 30 cps	TTY 33/35 and compatible units at 10 or 30 cps; IBM 2741 and compatible units at 14.8 cps	TTY 33/35 and compatible units at 10 or 30 cps; IBM 2741 and compatible units at 14.8 cps
Batch terminals supported	IBM 2780 & compatible units	IBM 1130, 2780, 3780, & S/360 HASP Multileaving terminals	Any HASP workstation	IBM 2780, 3780, 360/20, 1130, or any other HASP RJE terminal	IBM 2780, 3780, 360/20, 1130, or any other HASP RJE terminal
<b>SOFTWARE</b> Conversational programming languages	BASIC/APG, FORTRAN, BASIC, COBOL, SNOBOL, LISP, Macro-10, AID, ALGOL	—	AXSIM	FORTRAN, ALGOL, COBOL, PL/1, APL, Assembler, BASIC	FORTRAN, COBOL, PL/1, APL, Assembler
Batch-mode programming languages	BASIC/APG, FORTRAN, BASIC, COBOL, SNOBOL, LISP, Macro-10, AID, ALGOL	Extracto, Tabulo, Infoval	FORTRAN, COBOL, PL/1, Assembler	FORTRAN, APL, COBOL, PL/1, BASIC	FORTRAN, COBOL, PL/1, APL, Assembler
Principal applications	Business & scientific	Business & data base management	Business, scientific, & text processing	Business & scientific	Business & scientific
<b>CHARGES</b> Min. monthly charge: Interactive	\$100 (after 2 mo.)	—	\$50	None	None
Remote batch	—	As contracted	None	None	None
Terminal connect time: Interactive	\$10/hr.	—	\$2.75/hr.	\$6.00-11.00/hr.	\$8.00-14.00/hr.
Remote batch	—	None	\$15/hr.	\$12.00-24.00/hr.	\$16.00-40.00/hr.
Central processor time: Interactive	\$0.10/Core Unit	—	\$0.01/Proc. unit	\$0.32-0.71/sec.	\$2.00/CCU
Remote batch	—	\$4.00/min.	\$10 to \$15 minimum	\$0.32/sec.	\$2.00/CCU
Mass storage: Interactive	\$3.75/5120 chars./month	—	\$0.13/1000 chars./month	\$0.0031-0.0057/1000 chars./day	\$0.015-0.050/track/day
Remote batch	—	As contracted	\$0.065/1000 chars./month	Same	Same
<b>COMMENTS</b>	Offers deferred unattended execution at reduced rates; volume discounts of 40 to 70% on mass storage. Offers automatic COBOL program generator (BASIC/APG)	Additional charges for printing, reading, punching, and tape mounting; Canadian subsidiary of System Development Corp.	Features text editing, typesetting, & mailing list processing	Interactive time-sharing service	Offers remote job entry at a range of service times (10 minutes to overnight)

All About Time-Sharing and  
Remote Computing Services

COMPANY	Boeing Computer Services, Inc.	Bowne Time Sharing, Inc.	Bowne Time Sharing, Inc.	Bowne Time Sharing, Inc.	Chi Corporation
GENERAL					
Name of service	Mainstream EKS	COMSPEC	MAILPAC	Word/One	Chi Time-Sharing, Chi Remote Batch
Date operational	Jan. 1975	Dec. 1970	Sept. 1974	Nov. 1969	May 1968
Areas currently served	Continental U.S. and Canada via nation- wide data network and communication system; also Great Britain	Atlanta, Boston, Conn., Chicago, Houston, L.A., New York, New Jersey, Phila., San Francisco, & Washington, D.C. areas	Atlanta, Boston, Conn., Chicago, Houston, L.A., New York, New Jersey, Phila., San Francisco, & Washington, D.C. areas	Atlanta, Boston, Conn., Chicago, Houston, L.A., New York, New Jersey, Phila., San Francisco, & Washington, D.C. areas	Ohio, Pennsylvania Michigan, New York
EQUIPMENT					
Computers	CDC 6600, Cyber 74	IBM 370/155 in New York City	IBM 370/155 in New York City	IBM 370/155 in New York City	UNIVAC 1108 & Honeywell 430 (2) in Cleveland
No. of simultaneous users	256	200	200	200	60 on 430's; 32 on 1108
Conversational ter- minals supported	TTY 33/35 and compatible units at 10 or 30 cps; IBM 2741 and compatible units at 14.8 cps	IBM 2741, TTY, and compatible units at 10, 14.8, 15, or 30 cps	IBM 2741, TTY, and compatible units at 10, 14.8, 15, or 30 cps	IBM 2741, TTY, and compatible units at 10, 14.8, 15, or 30 cps	TTY 33/35/38, Data- point 3300, GE TermiNet 300, AJ 630, DCT 500, etc., at 10, 30, or 120 cps
Batch terminals supported	COPE, HASP, CDC CDC 200 UT	—	—	—	UNIVAC 1004, 9200; 9200; IBM 2780, 1130, 360/20; Data 100, etc.
SOFTWARE					
Conversational pro- gramming languages	FORTRAN, COBOL, APL, Compass, Simsript	COMSPEC; specifi- cation preparation	MAILPAC I & II letters, lists, & labels system	Word/One (text editing)	BASIC, FORTRAN, EDIT, SAM
Batch-mode program- ming languages	FORTRAN, COBOL, APL, Compass, Simsript	—	—	—	FORTRAN, BASIC, ALGOL, COBOL, RPG, etc.
Principal applications	Business & scientific	Construction specifi- cation preparation	List maintenance, letters, & labels	Text editing & type- setting	Business, scientific, & phototypesetting
CHARGES					
Min. monthly charge:					
Interactive	None	\$150	\$150	\$150 (after 3 mo.)	None
Remote batch	None	—	—	—	None
Terminal connect time:					
Interactive	\$10.00-14.00/hr.	\$2.95-5.30/hr.	\$2.95-5.30/hr.	\$2.95-5.30/hr.	\$7.00/hr.
Remote batch	\$11.00-18.00/hr.	—	—	—	\$7.00-10.00/hr.
Central processor time:					
Interactive	\$2.00/CCU	\$0.01/Proc. Unit	\$0.01/Proc. Unit	\$0.01/Proc. Unit	\$4.20/min.
Remote batch	\$0.60-1.25/CCU	—	—	—	\$18.00/min.
Mass storage:					
Interactive	\$0.0055/640 char./day	\$0.28/1550 chars./month	\$0.28/1550 chars./month	\$0.28/1550 chars./month	\$0.35/1000 chars./month
Remote batch	Same	—	—	—	\$0.20/2772 chars./month
COMMENTS	Offers both interac- tive time-sharing and remote job entry in multi-mainframe environment	Several master and automated specifica- tion text data bases are available	System can be used to send Western Union Mailgrams	Specializes in text editing, typesetting, information retrieval, and address file maintenance; volume discounts available	Offers both time- sharing and remote batch services; sub- stantial volume dis- counts; lower rates for non-prime time

## All About Time-Sharing and Remote Computing Services

COMPANY	Community Computer Corporation	Compudial, Inc.	Compu-Serv Network, Inc.	Computel Systems Limited	The Computer Company
<b>GENERAL</b>					
Name of service	—	Compudial	—	Time Shared Pro- cessing	Action/APL
Date operational	Jan. 1969	1967	May 1970	Jan. 1968	Oct. 1969
Areas currently served	Delaware Valley	Mid-Atlantic States	Local access in over 30 U.S. cities	Canada from offices in Victoria, Van- couver, Edmonton, Calgary, Winnipeg, Ottawa, Toronto, Montreal, Quebec, Sudbury, & Halifax	U.S., Canada, France, Belgium, Switzerland
<b>EQUIPMENT</b>					
Computers	HP 2116B (2) in Philadelphia	NCR 201	DEC PDP-10 (9) in Columbus, Ohio	IBM 370/168, IBM 360/65, & UNIVAC 1108 in Ottawa	IBM 370/155
No. of simultaneous users	32	250	405	Not specified	140
Conversational ter- minals supported	TTY and other ASCII-coded ter- minals at 10 or 30 cps	GE TermiNet 300 (split platen) at 10, 30, and 120 cps; Centronics 301	All ASCII at 10, 15, and 30 cps, GE TermiNet at 120 cps, IBM 2741 Corresp., CALL-360 & BCD	IBM 2741 and equi- valents and ASCII terminals	All 10, 15, and 30 cps; ASCII, BCD, and Corresp.
Batch terminals supported	—	—	—	All IBM batch ter- minals and equiva- lents; UNIVAC 1004 and equivalents	IBM 2780 and com- patible or emulated units
<b>SOFTWARE</b>					
Conversational pro- gramming languages	BASIC	NEAT 3, COBOL	FORTRAN, BASIC, COBOL, MACRO-10, others	Demand Processing, TSO, ROSCOE, APL	APL
Batch-mode program- ming languages	FORTRAN, ALGOL	—	FORTRAN, BASIC, COBOL, MACRO-10, others	FORTRAN, COBOL, PL/1, ALGOL, RPG, Assembler, Mark IV	SPSS service through APL—interactive/RJE
Principal applications	Business & scientific	Business	Business & scientific	Business & scientific	Business & scientific
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	None	\$300/month	\$100/period	\$100	\$100
Remote batch	—	—	—	\$100	—
Terminal connect time:					
Interactive	\$10.00	None	\$10.00-14.50/hr.	\$5.00-10.00/hr.	\$10.00-15.00/hr.
Remote batch	—	—	No charge	None	—
Central processor time:					
Interactive	None	See Comments	\$0.02/SRU	See Comments	\$24.00/min.
Remote batch	—	—	\$0.02-0.012/SRU	See Comments	\$265/hour
Mass storage:					
Interactive	\$0.20/160 chars./month	See Comments	\$0.055/3200 char./day	\$0.03/track/day	\$10.00/million bytes/day
Remote batch	—	—	\$0.055/3200 char./day	\$0.03/track/day	—
<b>COMMENTS</b>	Storage beyond 80,000 characters is priced at \$0.05/ 160 chars./month	Costs are on a per- transaction basis	High-speed plotting with CalComp 745 flatbed available at \$60/hr.; member of Ilex Corporate Group	Prices vary with com- puter and software system used; volume and commitment discounts are avail- able	Offers shared files and data base appli- cations; specialized data bases, & RJE

All About Time-Sharing and  
Remote Computing Services

COMPANY	Computer Innovations	Computer Network Corp. (Comnet)	Computer Research Company	Computer Resource Services, Inc.	Computer Sciences Canada, Ltd.
<b>GENERAL</b> Name of service	Advanced APL, Enhanced ATS	Alpha	Open Job Shop	Response	Infonet
Date operational	June 1969	Dec. 1967	Sept. 1971	1969	July 1967
Areas currently served	Illinois, Indiana, Michigan, Minnesota, Wisconsin; 8 cities in the East; 9 cities in the West	Continental U.S. via national network access; local dial-up access in the New York, Washington, & Pittsburgh areas	Midwestern U.S.	Phoenix and Las Vegas areas	Calgary, Edmonton, Montreal, Ottawa, Quebec, Toronto, Vancouver, Winnipeg
<b>EQUIPMENT</b> Computers	IBM 360/65 in Van Nuys, Calif.	IBM 360/65 (2) in Washington, D.C.	IBM 370/158 in Chicago	HP 2000 (2) in Phoenix, Ariz.	UNIVAC 1108 (2); 1 in Toronto and 1 in Calgary
No. of simultaneous users	120	75	30	32	180 total
Conversational ter- minals supported	Selectric/ASCII type terminals at 10, 15, or 30 cps	IBM 2741, TTY 33/35, and com- patible units at 10 to 120 cps	TTY 33/35, IBM 2741, IBM 3270, and equivalents	Any ASCII or Correspondence Code terminal at 10 to 30 cps	TTY 33/35 and compatible units at 10, 15, 30, or 120 cps; IBM 2741 or equivalent
Batch terminals supported	IBM 2780, etc.	IBM 2780, 1130, 360/20, and com- patible units at 2000 to 9600 bps	IBM 2770, 2780, 3780, 360/20, 1130, System/3, and equi- valents	—	IBM 2780 & 1130, UNIVAC 9200, 1004, & DCT 2000, Honeywell Series 2000, etc.
<b>SOFTWARE</b> Conversational pro- gramming languages	APL	All OS/360 languages	FORTRAN, COBOL, PL/1, Assembler	BASIC	FORTRAN, BASIC, COBOL, Assembler
Batch-mode program- ming languages	All OS/360 languages	All OS/360 languages	FORTRAN, COBOL, PL/1, Assembler, RPG	—	FORTRAN, BASIC, COBOL, Assembler
Principal applications	Business, scientific, & text editing	Business & scientific	Business, scientific, & text editing	Business & scientific	Business & scientific
<b>CHARGES</b> Min. monthly charge: Interactive	None	None	None	\$25	\$50
Remote batch	—	None	None	—	\$50
Terminal connect time: Interactive	\$12.50-15.50/hr.	\$12/hr. (10-120 cps)	\$3.75-7.50/hr.	\$10/hr.	\$11.00-15.00/hr.
Remote batch	—	\$0.50/1000 cards, \$0.50/1000 lines	\$5.00-10.00/hr.	—	\$8.00/hr.
Central processor time: Interactive	\$24.00/min.	\$0.20/CUU	\$14.40/min.	None	\$0.25/SRU
Remote batch	—	\$0.20/CUU	\$9.60/min.	—	\$0.07-0.16/SRU
Mass storage: Interactive	\$12.50/million bytes/day	\$2.00/13,030 chars./month	\$0.024/1000 chars./month	\$0.60/1024 chars./month	\$0.031/2040 chars./day
Remote batch	—	\$2.00/13,030 chars./month	\$0.024/1000 chars./month	—	\$0.031/2040 chars./day
<b>COMMENTS</b>	Affiliated with Proprietary Com- puter Systems, Inc.; offers high-speed RJE and RJE via APL & ATS	Offers "OS-com- patible time-sharing services" and remote job entry at a wide range of service times, terminal speeds, and charges	Runs under OS/VS2 and includes TSO, HASP/RJE, and ATS; CPU charges shown are for 100K bytes of main mem- ory	\$50 initiation fee	CPU charges for re- mote job entry vary with priority; dis- counts for high- volume usage; lower rates for non-prime time

## All About Time-Sharing and Remote Computing Services

COMPANY	Computer Sciences Corporation	Computer Sharing Services, Inc.	Computility Div., Call Data Systems, Inc.	Computone Systems, Inc.	Comshare, Incorporated
<b>GENERAL</b> Name of service	Infonet/CSTS	DTSS	Comp/Utility	—	Commander I & Commander II
Date operational	Jan. 1970	Nov. 1967	1970	1966	1967
Areas currently served	Local access in 23 metropolitan areas throughout continental U.S.	Local access in 26 metropolitan areas throughout continental U.S.	Local access in 25 metropolitan areas	Entire U.S. via national INWATS service	Continental U.S.; 6 cities in Canada; 6 in the U.K., The Hague; Brussels, Osaka, and Tokyo
<b>EQUIPMENT</b> Computers	UNIVAC 1108 (9) in El Segundo CA and Oak Brook IL	Honeywell 6060 in Denver	DECsystem-10 (3)	IBM 360/55 in Atlanta	Xerox 940 (10) and Sigma 9 in Ann Arbor, Mich.; Sigma 9's also in London and Tokyo
No. of simultaneous users	1080 to 1170 total	200	200 total	48	42 per 940, 64 per Sigma 9
Conversational terminals supported	TTY 33/35 and compatible units at 10, 15, 30, or 120 cps; 2741 or equivalent; Telex	TTY 33/35, IBM 2741, and compatible units at 10, 14.8, 15, 30, or 120 cps	Any ASCII terminal at 10, 15, 30, or 120 cps	TTY, TI, Memorex 120 cps; Keyfact portable insurance terminal (made by Computone)	TTY 33/35 and any compatible unit at 10, 30, 60, or 120 cps
Batch terminals supported	IBM 2780 & 1130, Data 100, DEC PDP-11, Sycor, Qantel, M&M, etc.	IBM 2780 and compatible units	IBM 2780 and compatible units	—	IBM 2780 & 3780, Remcom 2780 & 4780, Data 100 Model 70, Mohawk 2400, etc.
<b>SOFTWARE</b> Conversational programming languages	FORTRAN, BASIC, COBOL, Assembler	FORTRAN, BASIC, COBOL, ALGOL, APL, LISP, SNOBOL, QED, GMAP	FORTRAN, BASIC, COBOL, ALGOL, AID, LISP, Macro 10	—	FORTRAN, COBOL, BASIC, APL, Assembler
Batch-mode programming languages	FORTRAN, BASIC, COBOL, Assembler	All conversational languages can be used in background or batch mode	FORTRAN, BASIC, COBOL, ALGOL, SNOBOL, LISP, Macro 10	—	FORTRAN, APL, COBOL, BASIC, Assembler
Principal applications	Business & scientific	Business & scientific	Business & scientific	See Comments	Business & scientific
<b>CHARGES</b> Min. monthly charge:					
Interactive	\$150	\$100	None	See Comments	None
Remote batch	\$150	\$100	None	—	None
Terminal connect time:					
Interactive	\$5.50-15.00/hr.	\$3.00-20.00/hr.	\$5.00-8.00/hr.	—	\$7.20-19.80/hr.
Remote batch	\$4.00-20.00/hr. plus	\$3.00-20.00/hr.	\$5.00-8.00/hr.	—	\$8.40-24.00/hr.
Central processor time:					
Interactive	\$0.15/100 records	\$0.04-0.38/Unit	\$0.03/CPU sec	—	\$0.03-0.07/CCU
Remote batch	\$0.21-0.26/SRU	\$0.04-0.38/Unit	\$0.03/CPU sec	—	\$0.03-0.07/CCU
Mass storage:					
Interactive	\$0.026/2048 chars./day (on-line)	\$1.50-2.65/4096 chars./month	\$0.50/1280 chars./month (on-line)	—	\$0.30/2048 bytes/month
Remote batch	\$0.026/2048 chars./day (on-line)	\$1.50-2.65/16,384 chars./month	\$0.50/1280 chars./month (on-line)	—	\$0.30/2048 bytes/month
<b>COMMENTS</b>	CPU charges for remote batch use vary with priority; discounts for high-volume usage; lower rates for non-prime time; dedicated systems are available	Offers numerous pricing options; first commercial installation of Dartmouth Time-Sharing System; also offers voice response (Votrax) time-sharing	Offers facilities management services; discount plans available	Dedicated system for life insurance sales, feed and meat formulation, and turnkey market information; prices upon request	Offers both interactive and remote batch services through TELEGRID communications network; specializes in accounting, data base management, human resource mgmt., telephone systems mgmt., mechanical and structural design

All About Time-Sharing and  
Remote Computing Services

COMPANY	Comshare Limited	Control Data Corporation	Cybershare Limited	Cyphernetics Division, ADP Network Services, Inc.	Data Resources Inc.
<b>GENERAL</b>					
Name of service	Commander 18, Commander 11, COM-SYS 2.0	Cybernet Services	KRONOS	Cyphernet System	—
Date operational	1969	1966	July 1972	1969	1969
Areas currently served	Dataroute dial service to Montreal, Ottawa, Hamilton, London, and Vancouver; local dial-up service in Toronto, access via Comshare, Inc. & Comshare UK networks	Entire U.S., Canada, Mexico, S. Africa, Europe; Brazil, & Australia	Alberta, Manitoba, Ontario, Saskatchewan, British Columbia	Full service offices in 26 cities throughout the U.S., plus London, Brussels, The Hague, Cologne, & Frankfurt	All major U.S. cities plus Montreal, Ottawa, Toronto, & Central Europe, all via local-call access
<b>EQUIPMENT</b>					
Computers	Xerox Sigma 9 (2) Toronto	25 large-scale Control Data computers in 76 worldwide centers	CDC 6500 and CDC 1700 in Winnipeg	DECsystem-10 (8) in Ann Arbor, Mich.	Burroughs B 7700 (duplex system) in Lexington, Mass.
No. of simultaneous users	64 per Sigma 9	Several thousand	512 timesharing, 46 remote batch	450 total	Over 180 total
Conversational terminals supported	Any ASCII terminal up to 120 cps; also graphic terminals	Any ASCII terminal at 10 or 30 cps; Correspondence terminals at 14 cps	TTY 33/35 and compatible units	All 10, 14.8, 30, and 120 cps terminals; Tektronix and other graphic terminals	TTY-compatible units at speeds to 120 cps; IBM 2741, AJ 841, and Computer Devices at 14.8 cps
Batch terminals supported	IBM 2780 and compatible units	Various Control Data terminals at 2000 to 40,800 bps; COPE, Data 100, & Mohawk	CDC 200, 731, & 734; IBM 360/20, Comterm, Mohawk, Remcom, Data 100	IBM 2780, Data 100, and compatible units	IBM 2780, Burroughs DC 1100, or equivalent units
<b>SOFTWARE</b>					
Conversational programming languages	FORTRAN, BASIC, COBOL, APL, SNOBOL, QED, Metasymbol	FORTRAN, BASIC, COBOL, APL, SIMULA, SIMSCRIPT	FORTRAN, BASIC, APL, Text Editor	FORTRAN, BASIC, COBOL, Macro 10	FORTRAN, BASIC, COBOL, APL, PL/1, EPL, AID, MODSIM
Batch-mode programming languages	FORTRAN, BASIC, COBOL, APL, SNOBOL, QED, Metasymbol	FORTRAN, BASIC, COBOL, ALGOL, COMPASS, SIMULA, SIMSCRIPT	FORTRAN, COBOL, Compass, Spectre	FORTRAN, BASIC, COBOL, Macro 10	FORTRAN, BASIC, COBOL
Principal applications	Business & scientific	Business, engineering, & scientific	Business & scientific	Business & scientific	Business & scientific
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	None	\$100	None	None	\$125
Remote batch	None	None	None	None	\$125
Terminal connect time:					
Interactive	\$8.00-12.00/hr.	\$9.00-20.00/hr.	\$8/hr.	\$10.00-15.00/hr.	\$10.00/hr.
Remote batch	\$8.00-12.00/hr.	\$10.00-25.00/hr.	\$12.00-15.00/hr.	—	\$20.00/hr.
Central processor time:					
Interactive	\$0.08-0.12/CCU	\$0.30/sec.	\$13.20/min.	\$0.02/CRU	\$0.17-1.25/sec.
Remote batch	\$0.08-0.12/CCU	\$0.21-0.65/sec.	\$6.00-13.20/min.	\$0.01-0.02/CRU	\$0.17-1.25/sec.
Mass storage:					
Interactive	\$0.20-0.60/2048 bytes/month	\$0.016/1280 chars./day	\$0.30/1280 chars./month	\$0.06-1.00/1000 chars./month	\$0.20-0.80/1000 chars./month
Remote batch	\$0.20-0.60/2048 bytes/month	\$0.013/1280 chars./day	\$0.30/1280 chars./month	\$0.06-1.00/1000 chars./month	\$0.20-0.80/1000 chars./month
<b>COMMENTS</b>	Offers service in most major Canadian cities via Dataline 2 and Dataroute; an affiliate of Comshare, Inc. with international data communications to U.S. and U.K.	Also see The Service Bureau Company, which is now a division of Control Data Corporation	Formerly called Phoenix Data Limited	International data communications network can link any client to any system; charges depend upon volume and type of contract; offers remote facilities management	Specializes in electronic planning and analysis; offers Economic Information System at charges of \$1,500 per year and up



## All About Time-Sharing and Remote Computing Services

COMPANY	Data-Tek Corporation	Datacrown Limited	Dataline Systems Limited	Datalogics, Inc.	Dialcom, Inc.
<b>GENERAL</b>					
Name of service	—	Shared Processing	Dataline Time Sharing Network	DL/OS	—
Date operational	Dec. 1971	June 1972	1969	1969	1970
Areas currently served	Mid-Atlantic States	All of Canada and United States	All of Canada (Van- couver to Halifax via Dataroute Dataline II services)	Ohio, Illinois, New York and Pennsyl- vania	Local dial-up service in over 20 cities across the U.S. via nationwide network
<b>EQUIPMENT</b>					
Computers	Xerox Sigma 7	IBM 370/168 (3) in Willowdale, Ont.	DECsystem-10/70 (4) in Toronto	Xerox Sigma 7 in Cleveland	Honeywell 1648A: 2 in Silver Spring, Md., 1 in Minneapolis
No. of simultaneous users	86	Over 150	275	Approx. 100	192
Conversational ter- minals supported	TTY-compatible units at 10, 15, or 30 cps	IBM 2741, 3270; Vucom II; TTY and compatible units at 10 or 30 cps	All ASCII terminals at 10 or 30 cps; IBM 2741; Diablo; graphics (e.g., Tek- tronix)	TTY and other ASCII terminals at 10, 30, or 120 cps; IBM 2741	TTY and other ASCII terminals at 10 or 30 cps; Corres- pondence units at 14.8 cps
Batch terminals supported	IBM 2780/3780, DCT 2000, COPE 1200, CDC 200, etc.	IBM, Data 100, Remcom, Sycor, Mohawk, Singer, Comterm, etc.	COPE .45, Honey- well G-115, IBM 2780 and equivalent units	IBM 2780 and com- patible units using HASP protocol	—
<b>SOFTWARE</b>					
Conversational pro- gramming languages	FORTRAN, BASIC, COBOL, APL, SNOBOL, Meta- symbol	TSO Command Language, FORTRAN, COBOL, Assembler	FORTRAN, BASIC, COBOL, APL, AID, LISP, SNOBOL	FORTRAN, BASIC, COBOL, APL, Text, Proforma	FORTRAN, BASIC COBOL, TEACH, SOLVE, DAP, Text Editor
Batch-mode program- ming languages	FORTRAN, BASIC, COBOL, APL, SNOBOL, Meta- symbol	FORTRAN, COBOL, PL/1, RPG, Assembler	FORTRAN, COBOL, LISP, SNOBOL	FORTRAN, APL, BASIC, COBOL, RPG, Metasymbol, Manage	—
Principal applications	Business, health, & scientific	Business & scientific	Business & scientific	Business & scientific	Business & scientific
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	\$10	None	\$10	None	\$25
Remote batch	\$10	None	None	None	—
Terminal connect time:					
Interactive	\$10.00/hr.	\$3.00-6.00/hr.	\$10.00-12.00/hr.	\$10.00-18.00/hr.	\$6.00/hr.
Remote batch	\$10.00/hr.	\$9.00-12.00/hr.	None	Variable	—
Central processor time:					
Interactive	\$0.15-0.30/sec.	\$28.00/min.	See Comments	\$0.08/CRU	None
Remote batch	\$0.12-0.25/sec.	\$17.00/min.	See Comments	\$0.04-0.16/CRU	U
Mass storage:					
Interactive	\$0.50/1000 chars./month	\$0.016/track/ day (IBM 3330)	\$0.30/640 chars./month	\$0.80/2048 chars./month	\$0.50/512 chars./month
Remote batch	\$0.50/1000 chars./month	\$0.016/track/ day (IBM 3330)	\$0.30/640 chars./month	\$0.80/2048 chars./month	—
<b>COMMENTS</b>	Offers municipal bonds program; port rates available; offers special programs re- lated to health care: HMO organizations and Methadone treat- ment centers	Offers discounts for volume usage and non-prime time; dedicated high-speed access ports available; DB/DC services and COM available	CPU charges vary with amount of main storage used; rates are much lower during non-prime hours; FPS and RAFTS available (financial planning system and remote access financial transaction system)	"Virtual port" and bulk usage contracts available; offers dis- counts for volume usage and non-prime time; "private funds" also available; Muni- cipality Administra- tion package offered	Offers special rates for large data bases and dedicated ports; offers tax return preparation service and common business applications

All About Time-Sharing and  
Remote Computing Services

COMPANY	Distrionics, Inc.	Financial Data	First Data Corporation	Fulton National Bank	General Electric Company
<b>GENERAL</b>					
Name of service	Electronic Accounting System for Distributors	—	First Data Service; "Clockwork" in N.Y.	Fulton Data	Mark III
Date operational	—	Oct. 1970	1970	1966	1965
Areas currently served	Nationwide via 2 service centers	Continental U.S.	New England, Mid-West, and Middle Atlantic States via multiplexers, WATS, FX, Telenet, & Data-Dial	Southeastern U.S. via multiplexers in major cities and INWATS service	Local-call service to more than 400 cities in North America, and (via satellite) Western Europe, Australia, and Japan
<b>EQUIPMENT</b>					
Computers	IBM 360/40 & 360/50	IBM 360/50 & 360/65 in St. Louis; IBM 360/50 in New York (2)	DECsystem-10 (8) in Waltham, Mass.	Honeywell 6080 (2) in Atlanta	More than 100 computers, including Honeywell 6000 and IBM 370/158, in two "supercenters" in Cleveland & Md.
No. of simultaneous users	350	—	Over 250	125 total	Up to 100 per computer
Conversational terminals supported	IBM 2740-II type; Novar 540-2, Diablo, DMC	IBM 1050, 1060, 2740, 2980, Burr. TC 700, TU 700; BR 2001; FDSI; NCR 270	"All American-made interactive terminals"	TTY and all compatible units at 10 to 30 cps	ASCII, EBCDIC, or Correspondence terminals at 10, 15, 30, or 120 cps
Batch terminals supported	—	—	FDC-73, all DEC batch terminals, IBM 2780, Data 100, etc.	"All"	IBM 2780, Data 100, Remcom 2780, MDS 2400, Honeywell G-115, RPS III, etc.
<b>SOFTWARE</b>					
Conversational programming languages	—	—	FORTRAN, BASIC, COBOL, ALGOL, LISP, SNOBOL, etc.	FORTRAN, BASIC	FORTRAN, BASIC, ALGOL, Editors, DATOOL
Batch-mode programming languages	—	—	FORTRAN, BASIC, COBOL, ALGOL, LISP, SNOBOL, etc.	COBOL, ALGOL, JOVIAL, Simscript, Databasic	FORTRAN, COBOL, Assembly, simulators
Principal applications	Business	Banking (thrift industry)	Business & scientific	Business & scientific	Business & scientific
<b>CHARGES</b>					
Min. monthly charge:	See Comments	See Comments			
Interactive	—	—	None	None	\$100/catalog
Remote batch	—	—	None	None	\$100/catalog
Terminal connect time:					
Interactive	—	—	\$0.00-10.00/min.	\$7/hour (300 bps)	\$7.00-30.00/hr.
Remote batch	—	—	\$7.50/hr.	\$15.00/hr. (2000 bps)	\$8.00-16.00/hr.
Central processor time:					
Interactive	—	—	\$0.00-18.00/min.	\$0.03/unit	\$0.10-0.40/CRU
Remote batch	—	—	\$0.00-9.00/min.	\$8.33/min.	\$215-280/NBU
Mass storage:					
Interactive	—	—	\$0.10-0.50/1000 chars./month	\$1.00/1280 chars./month	\$0.10-0.75/320 36-bit words/month
Remote batch	—	—	\$0.10-0.50/1000 chars./month	\$1.00/1280 chars./month	\$0.09/320 36-bit words/month
<b>COMMENTS</b>	Specializes in plumbing, air conditioning, electrical, & industrial supplies distributors; charges are based on percentage of net sales volume, as contractually negotiated	Serves savings & loan associations and mutual savings banks; monthly charges are based on number of accounts handled	CPU charges vary with amount of main storage used; offers stock market data base, financial modeling, and data management systems		Offers extensive data management facilities; CPU & NBU charges depend on resources required and other factors; discount for deferred processing; offers COM services

## All About Time-Sharing and Remote Computing Services

COMPANY	Genesee Computer Center, Inc.	Grumman Data Systems Network Services	GTE Data Services Incorporated	HDR Systems, Inc.	Honeywell Information Systems, Inc.
<b>GENERAL</b> Name of service	Genesee Services	Call Data	GTEDS Time-Sharing Service	HDR Systems KRONOS	Datanetwork
Date operational	Aug. 1968	Feb. 1970	Nov. 1971	Oct. 1972	July 1972
Areas currently served	Continental U.S. and Toronto via multiplexers and INWATS service	Middle Atlantic and New England; INWATS service to Conn., Del., Mass., N.H., N.J., Pa., R.I., & Vt.; also see Comments	Continental U.S. plus Hawaii	Omaha and surrounding areas	Entire U.S.; local service in most large cities plus INWATS service
<b>EQUIPMENT</b> Computers	CDC 6600, 7600, and Cyber 72 belonging to Control Data (Cybernet) and Multiple Access Ltd.	IBM 370/155, IBM 370/168, CDC Cyber 73, DECsystem-10, Honeywell 635	CDC 6500, CDC 6600, and CDC Cyber 73-28 (2); Honeywell 66/20	CDC 6400 in Omaha, Neb.	Honeywell 6080 (2) in Minneapolis
No. of simultaneous users	Not specified	Over 300	1000 total	150	130
Conversational terminals supported	TTY and all compatible units at 10 or 30 cps	ASCII, EBCD, or Correspondence terminals at 10, 14.8, 15, 30, or 120 cps	TTY & compatible terminals at 10, 15, or 30 cps	TTY 33/35, CDC 713, Execuport, etc.; IBM 2741	TTY and compatible units at 10, 15, or 30 cps; Honeywell VIP displays; IBM 2741
Batch terminals supported	CDC 200, DEC PDP-11, IBM 1130, UNIVAC 9200/9300, Data 100, etc.	IBM 2780, 1130, 360/20, and compatible units	CDC 200 User Terminal and all compatible units at 2000 to 9600 bps	CDC 200 & 731, Data 100, M&M 500, Mohawk 2400, etc.	Most Honeywell computers; Data 100, Mohawk 2400, etc.
<b>SOFTWARE</b> Conversational programming languages	FORTRAN, COBOL, Compass	BASIC, BRUIN, APL, SNOBOL, SCRIPT, EDIT, FORTRAN, COBOL, PL/1, RPG	FORTRAN, BASIC, Text Editor	FORTRAN, APLUM, BASIC, COBOL, Text Editor	FORTRAN, COBOL, BASIC, Text Editor
Batch-mode programming languages	FORTRAN, COBOL, Compass	FORTRAN, APL, COBOL, PL/1, Assembler, RPG,	FORTRAN, BASIC, COBOL, Simscript, Compass	FORTRAN, COBOL, Compass	FORTRAN, COBOL, ALGOL, JOVIAL, GMAP, COBOL/IDS
Principal applications	Engineering & scientific	Business, engineering, & scientific	Business & scientific	Business & scientific	Business & scientific
<b>CHARGES</b> Min. monthly charge:					
Interactive	None	None	\$100	\$100	\$200
Remote batch	None	None	\$100	\$100	\$200
Terminal connect time					
Interactive	\$9.00/hr.	\$8.25-13.75/hr.	\$10.50-22.00/hr.	\$5.00/hr. (10-30 cps)	\$11.00/hr.
Remote batch	\$10.00/hr.	No charge	\$10.00-30.00/hr.	\$10.00/hr. (2000 bps)	\$33.00/hr.
Central processor time:					
Interactive	\$0.30/sec.	\$0.39/virtual sec.	\$1.50-30.00/min.	\$0.20/sec.	\$0.10/TSU
Remote batch	\$0.21-0.65/sec.	\$6.50-13.00/min.	\$9.60-33.60/min.	\$0.20/sec.	\$0.10/RBU
Mass storage:					
Interactive	\$0.01/1000 chars./day	\$8.00-20.00/3330 cylinder/month	\$0.40-0.50/1280 chars./month	\$0.20/640 chars./month	\$0.08-0.65/320 36-bit words/month
Remote batch	\$0.01/1000 chars./day	\$8.00-20.00/3330 cylinder/month	\$0.40-0.50/1280 chars./month	\$0.20/640 chars./month	\$0.08-0.65/320 36-bit words/mo.
<b>COMMENTS</b>	Provides specialized technical services, and resells Control Data or Multiple Access computer services, at the supplier's rates, in the process	Also operates Call Data DTSS Cyber 73 and DECsystem-10 serving Continental U.S.	Offers general time-sharing services plus large library of applications programs for telephone companies	Offers powerful text editing system and professional consulting services	Offers 160 hours/week nationwide access to GCOS multidimensional computing, plus 24-hour customer service hotline

# All About Time-Sharing and Remote Computing Services

COMPANY	Information Systems Design	Interactive Data Corporation	Interactive Sciences Corporation	International Timesharing Corporation	Itel Corporation
<b>GENERAL</b>					
Name of service	ISD	CS/ES	—	3300, 1640, and 360 Networks	Itel's On-Line Service
Date operational	May 1968	1968	May 1969	May 1968 (3300)	1968
Areas currently served	Entire U.S. via INWATS for batch, Tymnet for demand	All of continental U.S. except Alaska; London, England	Mid-Atlantic and New England States; multiplexers in Detroit, and Schenectady	Atlanta, Boston, Chicago, Denver, Detroit, L.A., N.Y., Minneapolis, St. Paul, San Francisco, & 5 other cities	Nationwide
<b>EQUIPMENT</b>					
Computers	UNIVAC 1108 (3) in Santa Clara, Cal.	IBM 3701/168 in Waltham, Mass.	DECsystem-10 (2) in Braintree, Mass.	CDC 3300 (2) & Honeywell 1648A (4) in Chaska, Minn.; IBM 360/65 in Palo Alto, Cal.	IBM 370/155 (2) in White Plains, N.Y.
No. of simultaneous users	109	150	128 total	130	575
Conversational terminals supported	IBM 2741, TTY, compatible ASCII units at 10, 30, or 120 cps; Tektronix graphics terminals	10, 30, & 120 cps EBCD (IBM 2741 compatible)	Nearly all ASCII units to 300 bps; also IBM & other BCD, Selectric, & Correspondence units	TTY, IBM 2741, & compatible units at 10, 15, or 30 cps	IBM 2741 & 3767, Memorex 1240, at 15 and 30 cps
Batch terminals supported	Cope Series, Data 100, DEC PDP-8, IBM 1130 & 2780, M&M, MDS, UNIVAC 1004, etc.	IBM 2780/3780/3741 and compatible units at 2000, 2400, & 4800 bps, EBCDIC	IBM 2780, 2968, & 2701/3704; MDS 2400 & 6403; UNIVAC 1004 & DCT 2000; etc.	IBM 2780, Cope 1200, Data 100, MDS 2400, Remcom 4780 (on 360 Network)	—
<b>SOFTWARE</b>					
Conversational programming languages	FORTRAN, BASIC, COBOL, ALGOL, APL, Editor	FORTRAN, BASIC, COBOL, PL/1, Assembler, XSIM, XDMS	FORTRAN, BASIC, COBOL, Macro, LISP, AID	FORTRAN, BASIC, COBOL, PL/1, Assembler, BPL, RUSH, etc.	Itel User Language
Batch-mode programming languages	FORTRAN, BASIC, COBOL, ALGOL, APL, Assembler, Editor	FORTRAN, BASIC, COBOL, PL/1, Assembler, XSIM	FORTRAN, COBOL, RPG	FORTRAN, BASIC, COBOL, PL/1, Assembly, BPL, RUSH, etc.	—
Principal applications	Engineering & scientific	Business & scientific	Business & scientific	Business & scientific	Business
<b>CHARGES</b>					
Min. monthly charge:					See Comments
Interactive	\$50	None	None	\$200	—
Remote batch	\$50	None	None	—	—
Terminal connect time:					
Interactive	\$5.00/hr. *	\$10-20/hr. (10-120 cps)	\$6.00-9.00/hr.	\$11.00/hr.	—
Remote batch	None if dedicated	None	None	—	—
Central processor time:					
Interactive	\$0.135-0.30/sec.	\$0.16/charge unit	\$0.01/CRU	\$0.14/CRU	—
Remote batch	\$0.135-0.30/sec.	\$0.08/charge unit	\$1.33/min.	—	—
Mass storage:					
Interactive	\$0.05/10,752 chars./day	\$0.08-0.16/1000 chars./month	\$0.01/640 chars./day	\$0.15-0.60/640 chars./month	—
Remote batch	\$0.05/10,752 chars./day	\$0.08-0.16/1000 chars./month	—	—	—
<b>COMMENTS</b>	Applications include graphics, structural engineering, circuit analysis, nuclear engineering, simulation, S-2000, etc.  * Plus packet charge	Offers portfolio management, banking, insurance, finance, brokerage, math-statistics, plotter-graphics, modeling, econometric data, management science, data base management, text processing	Offers financial modeling programs; lower rates for non-prime CPU time	Charges shown are for 3300 Network; 360 Network was acquired from Allen-Babcock in 11/73; 1640 Network was acquired from Honeywell in 4/73	Charges are based on transaction volume; also offers legal fee billing

## All About Time-Sharing and Remote Computing Services

COMPANY	Kaman Aerospace Corporation	Keydata Canada	Keydata Corporation	Management Systems Corporation	Manufacturing Data Systems, Inc.
<b>GENERAL</b> Name of service	Kaman TS Systems	Keydata	Keydata	Time Sharing & RJE Services	Compact II N/C Parts Programming
Date operational	Aug. 1971	1969	1965	April 1970	March 1969
Areas currently served	Central Connecticut	Major Canadian metropolitan areas; current subscribers in Toronto, Montreal, Winnipeg, and Van- couver	Continental U.S. & Canada; more than 40 concentrators	Salt Lake City, Provo, and Ogden, Utah; Eastern Idaho	All of U.S. and Canada, United Kingdom, France, West Germany, Japan
<b>EQUIPMENT</b> Computers	HP 2000F in Bloomfield, Conn.	UNIVAC 494 (3) in Foxboro, Mass.	DECsystem-10 (1), UNIVAC 494 (3) in Foxboro, Mass.	IBM 370/168 in Salt Lake City	Xerox 940 systems in Ann Arbor (Com- Share) and Palo Alto (Tymshare)
No. of simultaneous users	32	1,000	1,000	55 time-sharing, 6 RJE	Not specified
Conversational ter- minals supported	Any ASCII terminal at 10, 15, or 30 cps	TTY Model 28, GE TermiNet, Bell Canada Vucom, ADDS, DECwriter, Tally, Datapoint at 30 or 120 cps	TTY Model 28, GE TermiNet, ADDS, DECwriter, Tally, Datapoint 30 or 120 cps	Trendata 1000, Trendata 1500, IBM 2741, GTE 5741; 15 & 30 cps	TTY ASR 33, Western Union DT300, GE TermiNet
Batch terminals supported	—	—	—	IBM 2780 & S/3, Mohawk	—
<b>SOFTWARE</b> Conversational pro- gramming languages	BASIC	Keydata On-Line Processing Language (KOP III)	Keydata On-Line Processing Language (KOP III)	APL, ATS, TSO	Compact II
Batch-mode program- ming languages	—	—	—	FORTRAN, COBOL, PL/1, RPG, Assembler, Easytrieve	—
Principal applications	Business & scientific	Business	Business	Business & scientific	Numerical control
<b>CHARGES</b> Min. monthly charge:					
Interactive	None	\$800	\$800	None	\$50
Remote batch	—	—	—	On request	—
Terminal connect time:					
Interactive	\$5.50/hr.	See Comments	See Comments	\$3.00-3.75/hr.	\$10.00-14.00/hr.
Remote batch	—	—	—	None	—
Central processor time:					
Interactive	No charge	See Comments	See Comments	\$1.05/sec.	\$35/min.
Remote batch	—	—	—	\$0.75/sec.	—
Mass storage:					
Interactive	\$0.16-0.30/1000 bytes/month	See Comments	See Comments	\$0.04/6440 chars./day	\$1.00/1000 chars./month
Remote batch	—	—	—	On request	—
<b>COMMENTS</b>	Offers dedicated port (i.e., unlimited ac- cess) for \$500 (local to Hartford) or \$825 (statewide access) per month; non- prime connect time costs only \$3.00/hr.	All charges are based on number of trans- actions processed; dedicated system for interactive business data processing appli- cations	All charges are based on number of trans- actions processed; dedicated system for interactive business data processing appli- cations	Offers text process- ing system (ATS) to facilitate preparation of publications, pro- posals	Offers numerical control parts pro- cessing system, using Com-Share and Tymshare computers and communications networks

# All About Time-Sharing and Remote Computing Services

COMPANY	Mark/Ops	Martin Marietta Data Systems	McDonnell Douglas Automation Co.	Mellonics Information Center	Metridata Computing, Inc.
<b>GENERAL</b>					
Name of service	Mark/Ops	Computing Power through an RJE terminal	MCAUTO	—	Metrinet
Date operational	March 1967	1969	1967 (remote batch) 1968 (Time-sharing)	1968	Jan. 1969
Areas currently served	New England, New York, Washington, D.C., Chicago	U.S., Canada, Europe	Continental U.S. and Canada	California and various user sites across the U.S.	Multiplexers in Chicago, Cincinnati, Dayton, Detroit, and Indianapolis; foreign exchange in Colum- bus, O.
<b>EQUIPMENT</b>					
Computers	DEC PDP-10 (KI) & DEC PDP-11/45	IBM 370/168 (2); 370/158 (2), 370/ 155, 370/145, 360/ 50; CDC 6500, etc.	IBM 360/195, IBM 370/168 (4), & Xerox Sigma 9 (2) in St. Louis; IBM 370/168 (3), 370/158 (2) & CDC Cyber 74 in Cal. 25-64 per system	IBM 370/168 & 370/158	Honeywell 430 (2) & 440 (2);—IBM 360/65
No. of simultaneous users	64 & 20	300		80 TSO, 38 RJE	80 total
Conversational ter- minals supported	Any 10, 15, or 30 cps ASCII unit	IBM 2741, IBM 3270, TTY, or any com- patible unit	All ASCII units at 10 or 30 cps; IBM 2741, 3270, and compatible units; Computek & Tektronix graphics	All ASCII units at 10 or 30 cps; IBM 2741 & 3270	Any ASCII terminal at 10 or 30 cps
Batch terminals supported	Any 1200 bps ASCII unit	IBM 2780/3780 or any compatible unit	IBM 2770, 2780, 3780, 1130, 360/20, Sys/3; IBM 360/370 DOS & OS systems	Any HASP-com- patible RJE terminal	—
<b>SOFTWARE</b>					
Conversational pro- gramming languages	FORTRAN, BASIC, COBOL, Macro 10	FORTRAN, PL/1, BASIC, COBOL	FORTRAN, APL, BASIC, COBOL, PL/1 WATFIV, Assembler, WATBOL, IMS/DL-1	FORTRAN, PL/1, COBOL, BASIC, Assembler under TSO	FORTRAN, BASIC
Batch-mode program- ming languages	FORTRAN, BASIC, COBOL, Macro 10	FORTRAN, PL/1, BASIC, COBOL, RPG, Assembler, SNOBOL	FORTRAN, WATFIV, BASIC, COBOL, PL/1, RPG, Assembler, WATBOL, IMS/DL-1	FORTRAN, COBOL, PL/1, Assembler	COBOL
Principal applications	Business & scientific	Business & scientific	Business, scientific, & data base	Business & scientific	Business & scientific
<b>CHARGES</b>					
Min. monthly charge:		See Comments			
Interactive	None	—	None or \$10/ID	None	None
Remote batch	None	—	None	None	—
Terminal connect time:					
Interactive	\$8.00/hr. or \$7.50/hr.	—	None or \$10/hr.	\$7.50/hr.	\$10.00/hr.
Remote batch	\$12.00/hr.	—	None	\$12.00/hr.	—
Central processor time:					
Interactive	\$0.10/sec. (4K)	—	\$0.22-7.10/MRU	\$0.096/min. (158)	\$0.04/CPU unit
Remote batch	\$0.05/sec. (4K)	—	\$4.50-6.10/MRU	\$0.23/min. (168)	—
Mass storage:					
Interactive	\$0.01/640 chars./day	—	\$0.10/1024 char/wk. \$0.04/track/day	\$0.10/13,000 chars./week	\$0.75-1.75/1000 chars./month
Remote batch	\$0.01/640 chars./day	—	\$0.50/track/month (IBM 3330)	\$0.10/13,000 week	—
<b>COMMENTS</b>					
	Division of North- eastern Systems Associates; special- izes in large systems for specific custo- mers; lower rates for non-prime time and large data bases; dif- ferent rates apply for PDP-11/45 system	Price lists available on request; charges only for resources used related to re- sponse and volume; specializes in remote batch processing	Offers remote batch service and IMS pro- cessing (on-line and batch); also time- sharing on Sigma 9's (DAC) and 370/168's (TSO); Sigma 9's can access the other major processors, both IBM and CDC	Private line port is available for \$85 per week	Piggybacking on Tymshare's TYMNET



## All About Time-Sharing and Remote Computing Services

COMPANY	Multiple Access Limited	National CSS, Inc.	Newfoundland and Labrador Computer Service	NLT Computer Services Corp.	Ohio Valley Data Control, Inc.
<b>GENERAL</b> Name of service	—	VP/CSS	—	Distributor Services	Mister Cash and Bank-A-Term
Date operational	Oct. 1969	Dec. 1968	1970	1970	1972
Areas currently served	All of Canada & U.S.	East Coast, Midwest, West Coast, Arizona, Houston, Canada, London, Paris, Bonn	Eastern Canada	East of the Mississippi	Ohio, West Virginia, & Pennsylvania
<b>EQUIPMENT</b> Computers	CDC 6600 & Cyber 73, IBM 370/168 (3) in Toronto; UNIVAC 494 (3) in Boston	IBM 370/158 (3) & 370/168 in Stamford, Conn.; IBM 360/67 (3) in Sunnyvale, Calif.	IBM 370/155 in St. John's, Nfld.	Burroughs B 4700 & B 3700	Burroughs B 3700 (dual processors) in Belpre, Ohio
No. of simultaneous users	32 on CDC 6600, 128 on Cyber 73	725	30	150	Hundreds
Conversational ter- minals supported	TTY and all com- patible ASCII units at 10 or 30 cps	TTY and all com- patible units at 10, 15, 30, 60, or 120 cps	IBM 2740, 2741, 3270, TTY, or equi- valent	Burroughs TC 500, TC 3500, TC 3600, TD 700; DCC mini- computers	Burroughs B 342, 345, TD 700, TC 500, TU 500, TP 102
Batch terminals supported	IBM 360/20 & 1130, UNIVAC 9200/9300, CDC 200, Data 100, Comterm 2100, DEC PDP-8 & -11, etc.	Dial-up units at 1200 to 4800 bps leased-line units at 2400 to 9600 bps	IBM HASP and equivalent units	—	Burroughs B 342, B 345, TC 500, B 1700; Honeywell 2020
<b>SOFTWARE</b> Conversational pro- gramming languages	FORTRAN, BASIC, COBOL, Compass	FORTRAN, APL, BASIC, COBOL, PL/1, Assembler	FORTRAN, BASIC, COBOL, PL/1, Assembler	Datafile user's language	FORTRAN, COBOL
Batch-mode program- ming languages	FORTRAN, BASIC, COBOL, ALGOL, RPG, PL/1, Assembler, Compass, etc.	FORTRAN, APL, BASIC, COBOL, PL/1, Assembler	FORTRAN, COBOL, PL/1, ALGOL, RPG, Assembler, etc.	—	FORTRAN, COBOL
Principal applications	Business & scientific	Business & scientific	Business & scientific	Business	Business, banking, cash dispensing
<b>CHARGES</b> Min. monthly charge: Interactive Remote batch Terminal connect time: Interactive Remote batch Central processor time: Interactive Remote batch Mass storage: Interactive Remote batch	None None \$5.00-13.00/hr. \$20.00/hr. \$0.40/sec. (Cyber) \$0.25-0.65/sec. \$0.18/640 chars./month \$0.016/track/day (IBM)	None None \$10.00-20.00/hr. None \$0.20/VPU \$0.08-0.12/VPU \$10-22/120,000 bytes/month \$10-22/120,000 bytes/month	Not specified Not specified Not specified Not specified Not specified Not specified	See Comments — — — — — — —	\$500 \$1500 \$12.00/hr. \$25.00/hr. — — \$20/100,000 bytes/month \$20/100,000 bytes/month
<b>COMMENTS</b>	High-speed links between processors give all users on-line access to the com- puter systems net- work; also offers Keydata on-line commercial pro- cessing services	Offers data bases and data base man- agement systems	Provides EDP services for provincial govern- ment, university, and crown corporations	Charges are based on transactions; mini- mum monthly charge is \$1200; specializes in serving hard goods distributors	Specializes in bank- ing services; offers time-sharing, remote batch processing, and on-line cash dispensing service

All About-Time-Sharing and  
Remote Computing Services

COMPANY	On-Line Business Systems, Inc.	On-Line Systems, Inc.	Pacific Applied Systems Division, SDC	Paden Data Systems, Inc.	Polycom Systems Limited
<b>GENERAL</b>					
Name of service	—	—	TASC system of test automation	—	—
Date operational	July 1971	Dec. 1967	1971	1969	1969
Areas currently served	California and the West Coast	Entire U.S., Canada, and the U.K., toll-free access from 18 cities in U.S.	Continental U.S., Europe, and the Orient	Dallas-Fort Worth metropolitan area	Toronto, Southern Ontario, Montreal, Ottawa
<b>EQUIPMENT</b>					
Computers	IBM 370/158 in San Francisco	DEC PDP-10 (11) in Pittsburgh, DEC PDP-11 in U.K. for remote concentration	UNIVAC 1108, TI 960, IBM 370/145, 370/158 in California	Burroughs B 2700 in Dallas	Honeywell 440 & 6060 in Toronto
No. of simultaneous users	100	64 per system	300	15	250
Conversational terminals supported	All IBM-compatible terminals (e.g., 2260, 2740, 3270)	ASCII, EBCD, BCD, and Correspondence units at 10, 15, 30, or 120 cps	TTY-compatible units at 110 to 9600 bps	Burroughs TC 500 and TD 700	IBM 2741, GE TerminiNet, Tektronix, etc.; any ASCII terminal at up to 120 cps
Batch terminals supported	All IBM-compatible terminals	Data 100, etc.	UNIVAC 1004, IBM 2780, COPE, etc.	—	—
<b>SOFTWARE</b>					
Conversational programming languages	WYLBUR	FORTRAN, BASIC, COBOL, APL, Telcomp	TASC Test Oriented Language, FORTRAN	COBOL	FORTRAN, BASIC, COBOL, ALGOL, APL
Batch-mode programming languages	FORTRAN, COBOL, PL/1, Assembler	FORTRAN, BASIC, COBOL, APL, Telcomp	TASC Test Oriented Language, FORTRAN	COBOL, Assembler	FORTRAN, BASIC, COBOL, ALGOL, APL
Principal applications	Specialized business systems	Business & scientific	ATE program developments, electric circuit simulation	Business	Business & scientific
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	None	\$5.00/user no.	—	\$400	\$100
Remote batch	None	\$5.00/user no.	\$3,600 (2-year lease)	—	—
Terminal connect time:					
Interactive	See Comments	\$10.00/hr.	—	See Comments	\$12.00/hr.
Remote batch	\$10.00/hr.	None	Not applicable	—	\$12.00/hr.
Central processor time:					
Interactive	Not applicable	\$0.05/CP unit	—	See Comments	\$0.25/CPU
Remote batch	\$7.00/min.	\$0.05/CP unit	Not applicable	—	\$0.25/CPU
Mass storage:					
Interactive	\$0.06/1000 bytes/month	\$0.05/3200 chars./day	—	\$15/million chars./week	\$0.05-0.15/500 chars./month
Remote batch	\$0.03/1000 bytes/month	\$0.05/3200 chars./day	Not applicable	—	\$50.00/million chars./day
<b>COMMENTS</b>	Limited to applications such as reservations, order entry, POS, inventory, data base retrieval, etc.; billing is on a transaction basis	Service available 24 hours/day, 7 days/week; offers on-line data management, financial modeling, & resource management systems	Dedicated system tests simulation models for program development for automatic test equipment (ATE) & generates configuration control package; division of System Development Corporation	Offers integrated business data processing service; charges are based on transaction volume, plus telephone line costs	Reduced rates for non-prime time; dedicated ports available

## All About Time-Sharing and Remote Computing Services

COMPANY	PRC Computer Center, Inc.	Programs & Analysis, Inc.	Proprietary Computer Systems, Inc.	Pryor Corporation	Rapidata, Inc.
<b>GENERAL</b>					
Name of service	Conserve	Thrift Line Service	PCS/Computernet; PCS/Text & RJE	—	Rapidnet
Date operational	1970	1969	Oct. 1968	June 1969	Jan. 1969
Areas currently served	Continental U.S.	New England, New York, Southeast, and Midwest	Continental U.S. plus Hawaii, with offices in major cities, and Europe	Illinois, East and Midwest via network	Continental U.S. via INWATS and foreign exchanges; multiplexers in Atlanta, Boston, Chicago, L.A., N.Y., S.F. & other cities
<b>EQUIPMENT</b>					
Computers	IBM 370/155, DEC PDP-11/40 in McLean, Va.	Honeywell 6050 in Burlington, Mass.	IBM 360/65 (2) in Van Nuys, Calif.	Honeywell 440 in Louisville, Ky.	Honeywell 437 (13), DECsystem-1070 (2), DECsystem-1080, and IBM 370/158
No. of simultaneous users	96	64 total	120	50	500
Conversational terminals supported	TTY, IBM 2741, and compatible ASCII and EBCD units at 10, 15, or 30 cps	ASCII at 10 to 30 cps; IBM 2741 and compatible units	ASCII terminals at 10 to 30 cps; IBM 2741 and compatible units, including CRT displays	ASCII terminals at 10 or 30 cps	"Almost any" 10 to 120 cps unit
Batch terminals supported	IBM 2780 & 360/20, Data 100, Singer, Cope, etc.	Data 100, Harris COPE, Mohawk	IBM 2780, 3780, and compatible units	—	"Almost any" unit up to 4800 bps
<b>SOFTWARE</b>					
Conversational programming languages	BASIC	FORTRAN, BASIC, ALGOL	APL,SV, PCS/Text	FORTRAN, BASIC	FORTRAN, BASIC, COBOL, RIPS, DBMS
Batch-mode programming languages	FORTRAN, BASIC, COBOL, ALGOL, PL/1, RPG, Assembler	FORTRAN, COBOL, Assembly	FORTRAN, COBOL, PL/1, etc.	—	FORTRAN, COBOL, PL/1, Assembler
Principal applications	Business & scientific	Business & scientific	Business, finance, scientific, word processing	Business & scientific	Business & scientific
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	None	See Comments	None	\$50	\$10
Remote batch	None	—	None	\$500	\$10
Terminal connect time:					
Interactive	\$8.00/hr.	See Comments	\$2.50-12.00/hr.	\$10.00/hr.	\$5.00-25.00/hr.
Remote batch	None	—	\$11.00/hr.	—	\$30.00/hr.
Central processor time:					
Interactive	Not specified	See Comments	\$0.55/sec.	Not specified	\$0.024-0.06/CPU
Remote batch	Not specified	—	\$3.83-12.46/min.	—	\$0.024-0.06/CPU
Mass storage:					
Interactive	Not specified	See Comments	\$0.01/1000 chars./day	\$0.75/1000	\$0.20-0.60/1000 chars./month
Remote batch	Not specified	—	\$0.01/track/day	—	\$0.20-0.60/1000 chars./month
<b>COMMENTS</b>	Offers local and remote batch processing, TSO time-sharing, and ATS text editing, plus various other computer and professional services	Offers dedicated business, engineering, and scientific data processing services; each application is charged on a unit transaction basis	Computernet can mix interactive and batch processing, & mix APL and Text; PCS/Text is an improved version of IBM's ATMS; different rates apply to PCS/Text	Specializes in remote processing of billing, accounts receivable, sales analysis, payroll, inventory control, and accounts payable	Several data bases available for market statistics, stock markets, finance, economics, banking, international trade data, etc.; also offers voice response and graphic plotting

All About Time-Sharing and  
Remote Computing Services

COMPANY	Remote Computing Corporation	Scientific Process & Research, Inc.	Scientific Time Sharing Corporation	The Service Bureau Company	Shared Medical Systems, Inc.
<b>GENERAL</b> Name of service	R-NET	SPR Timesharing Network	APL*Plus	CALL/370 Management Time Sharing	Unifile, Action
Date operational	Oct. 1968	1969	Aug. 1969	1968 (CALL/360)	1969
Areas currently served	Continental U.S. via local dialing	Continental U.S.	Local access in over 60 cities in the U.S. plus Toronto, Canada	Local access in 106 U.S. & 11 international locations, including Canada, France, U.K., Belgium, Holland, Germany, & Sweden	Nationwide network in U.S.
<b>EQUIPMENT</b> Computers	Burroughs B 7700, B 6700, and B 5700	DEC PDP-10 (2) in Princeton, N.J.	IBM 370/155 (2) in Bethesda, Md.	IBM 370/158 (7) in Cleveland	IBM 370/168 (2)
No. of simultaneous users	200 on B 7700, 110 on B 6700, 32 on B 5700	60	100/system	Over 150/system	Over 300
Conversational terminals supported	Most ASCII units at 10 to 120 cps, Correspondence/EBCD units at 14.8 to 120 cps	TTY 33/35 and other ASCII terminals at 10 or 30 cps; IBM 2741	IBM 2741 & 3767, AJ 630 & 840, CDI 1030, DECwriter, Teleray, Tektronix 4013, etc., up to 120 cps IBM 2780, 3780, & System/3; Data 100, Cope, Sycor, Four-Phase, etc.	IBM 2741, TTY 33/35, and ASCII terminals at 10, 30, or 120 cps	IBM 1050
Batch terminals supported	Data 100, IBM 2780 and emulators, Singer M&M, Burroughs DC 1000	—	—	IBM 2780/3780 or equivalent; IBM S/360 & S/370 processors	IBM 2770, 2780, 3770, & 3780; Four-Phase
<b>SOFTWARE</b> Conversational programming languages	FORTRAN, PL/1, BASIC, COBOL, ALGOL	FORTRAN, ALGOL, BASIC, COBOL, Macro-10, etc.	APL	FORTRAN, BASIC, PL/1, Data Management	Not applicable
Batch-mode programming languages	FORTRAN, PL/1, BASIC, COBOL, ALGOL, Work Flow (WFL)	—	All System/370	FORTRAN, BASIC, PL/1, Data Management	Not applicable
Principal applications	Business; thrift, securities & commodities, data bases	Engineering, scientific and business	Business	Business & scientific	Hospital information & accounting
<b>CHARGES</b> Min. monthly charge: Interactive Remote batch Terminal connect time: Interactive Remote batch Central processor time: Interactive Remote batch Mass storage: Interactive Remote batch	\$100 \$100 \$11.00/hr. \$10.00/hr. \$0.30/RCU \$0.15-0.30/RCU \$3.20/million chars./day \$3.20/million chars./day	None — \$6.00-10.00/hr. — \$0.006-0.01/RAM — \$0.015/1000 chars./day less 10% connect charge	None — \$12.00/hr. (15 cps) \$75.00/hr. \$39.00/min. \$39.00/min. \$0.30/1000 chars./month —	\$100 — \$11.00-16.00+/hr. \$37.50/hr. (250 cps) \$0.16/PU \$0.06-0.12/PU \$0.012-0.02/1000 bytes/day \$0.006-0.015/1000 bytes/day	Contact vendor — — — — — — —
<b>COMMENTS</b>	Charges shown are for B 7700/6700 systems; discounts for non-prime time	Offers simulators for plastics processing and optimization package: extruding, blow molding, injection molding; also information retrieval	APL*Plus File Sub-system facilitates processing of large shared files and data bases; consulting and programming of customized applications	Subsidiary of Control Data Corp. since January 1973; also offers TSO, RJE, On Call/Plus, OS/HASP, remote computing service	An integrated information system for hospitals in the areas of communications, patient care, and financial processing

## All About Time-Sharing and Remote Computing Services

COMPANY	I.P. Sharp Associates Limited	A.O. Smith Corporation	Standard Information Systems, Inc.	Statistical Tabulating Corporation	Structural Dynamics Research Corp.
<b>GENERAL</b> Name of service	Sharp APL	Time-Sharing and RJE Service	SIS—Computer Services	STAT-TAB	SDRC Computer Operations
Date operational	1969	1969	1967	Spring 1972	Jan. 1969
Areas currently served	Continental U.S., Canada, United Kingdom, and The Netherlands	Continental U.S.	Atlanta, Boston, Chicago, Minneapolis, L.A., New York, Phila., San Francisco, & Washington, D.C. areas	Continental U.S.; dial-up access at 10, 14.8, 30, 120, & 200 cps; leased lines available	Nationwide access
<b>EQUIPMENT</b> Computers	IBM 370/145 (2) and Burroughs B 6700 in Toronto	IBM 370/165 in Milwaukee	CDC 3600's (3) in Waltham and Quincy, Mass., plus Honeywell 265	IBM 370/158 in Chicago	See Comments
No. of simultaneous users	240 total	Varies	230	99	See Comments
Conversational terminals supported	Asynchronous units up to 30 cps, including IBM 2741, AJ 841, GTE, Harris, Tektronix, etc.	TTY 33/35, Tektronix CRT's, Sycor 250, IBM 3270 & 2741, and compatible units	ASCII units at 10 or 30 cps; IBM 2741, Correspondence or EBCD and compatible units	All IBM-compatible low-speed hard-copy & CRT terminals; TTY 33/35 & compatible units	TTY 33/35 and other ASCII terminals at 10 or 30 cps
Batch terminals supported	IBM 2780 or equivalent	All IBM, Data 100, Harris COPE, Sycor, Mohawk, Datapoint, & compatible units	IBM 2780 and compatible units	All IBM-compatible medium-speed units	CDC 200 & 1700, IBM 1130, Data 100, Mohawk 2400, UNIVAC 9200, GA SPC-16, etc.
<b>SOFTWARE</b> Conversational programming languages	APL	PL/1 & Speakeasy under TSO	FORTRAN, BASIC, INFORM (DBMS/retrieval), CONFORM (financial planning/reporting)	CMS-supported languages, Hyper-faster	FORTRAN, BASIC
Batch-mode programming languages	System/370 & 6700 languages	FORTRAN, COBOL, PL/1, Assembler, RPG, Speakeasy	FORTRAN, BASIC, INFORM, CONFORM	FORTRAN, COBOL, PL/1, RPG, ADPAC, Assembler	FORTRAN, BASIC, COBOL, ALGOL, Assembly
Principal applications	Business & scientific	Business, scientific, & text editing	Business & scientific	Business & scientific	Mechanical design, structural analysis
<b>CHARGES</b> Min. monthly charge: Interactive Remote batch Terminal connect time: Interactive Remote batch Central processor time: Interactive Remote batch Mass storage: Interactive Remote batch	None — \$8.00/hr. — \$21.00/min. — \$0.165-0.30/1000 bytes/month —	None None \$8.00/hr. None \$0.30/sec. \$0.30/sec. \$0.017/1000 chars./month None	\$25 — \$10.00/hr. \$22.50/hr. \$0.03/CRU \$375/hr. \$0.60/1000 chars./month \$0.60/1000 chars./month	None None \$3.50-10.00/hr. \$10.00/hr. \$0.10-0.20/sec. \$0.10-0.80/sec. \$0.25/7294 bytes/week \$0.25/7294 bytes/week	None None \$9.50-13.00/yr. Varies with system \$1.80-24.00/min. Varies with system \$0.10-1.75/1000 chars./month Varies with system
<b>COMMENTS</b>	Company also provides systems consulting, makes CRT terminals, and produces special systems for real-time and process control applications	Runs under OS/MVT and offers TSO and HASP/RJE	Formerly Call-A-Computer, Inc.; offers greatly reduced rates for high-volume or non-prime usage; rates shown are for CDC 3600		Sells time on U.S. Steel, CDC, ACTS, GE, Com-Share, & Metridata systems; features mechanical design and structural analysis programs

All About Time-Sharing and  
Remote Computing Services

COMPANY	Systems Dimensions Limited	Technical Advisors, Inc.	Technology for Information Management, Inc.	Tel-A-Data, Inc.	Telstat Systems, Inc.
<b>GENERAL</b>					
Name of service	SDL Computer Services	TECH-MAC	TIM-Sharing	Tel-A-Data	TELAC/70
Date operational	June 1969	June 1967	Sept. 1968	Dec. 1966	Jan. 1971
Areas currently served	All major Canadian cities plus Eastern U.S.; multiplexers in Boston & New York; RJE terminals in Boston, N.Y. & Washington	Continental U.S. except Alaska (toll-free except in Michigan)	New York State	State of Florida	New York City metropolitan area
<b>EQUIPMENT</b>					
Computers	IBM 370/168 (2) & IBM 360/85 in Ottawa	Varian 622i (2); 1 in Wayne, Mich., and 1 in Phoenix, Ariz.	Honeywell 440 in Orlando, Fla.	Burroughs B 500	Xerox Sigma 9
No. of simultaneous users	80	20 in Wayne, 5 in Phoenix	50	64	64
Conversational terminals supported	IBM 2741 and compatible units; TTY and compatible ASCII terminals	TTY 33/35 & other ASCII terminals at 10 or 30 cps	TTY 33/35 & other ASCII terminals at 10 cps	TTY 33/35, GE TermiNet 300, Burroughs TC 500, Incoterm 10/20	TTY 33/35, IBM 2741, GE TermiNet 300, Datapoint 3300, Execuport, etc.
Batch terminals supported	IBM BSC terminals and equivalents	—	—	—	XDS 7670, IBM 2780, 1130, UNIVAC DCT 2000, etc.
<b>SOFTWARE</b>					
Conversational programming languages	SDL/Wylbur; all batch languages in fast batch mode	—	FORTRAN, BASIC	Assembler, COBOL	FORTRAN, BASIC, Symbol, ASSIST
Batch-mode programming languages	FORTRAN, SPSS, COBOL, PL/1, RPG, Mark IV, Assembler, RAMIS, WATFIV, Culprit	—	—	—	FORTRAN, COBOL, BASIC, Symbol, Metasymbol
Principal applications	Business & scientific	Civil engineering & surveying	Business & scientific	Business	Financial services
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	None	None	\$25	\$800	None
Remote batch	\$60	—	—	—	Not specified
Terminal connect time:					
Interactive	\$12.00/hr.	\$10-28/hr. (10 cps)	\$10.00/hr.	No extra charge	\$10.00/hr.
Remote batch	—	\$15-36/hr. (30 cps)	—	—	Not specified
Central processor time:					
Interactive	\$30.00/min.	None	\$3.00/min.	No extra charge	\$9.00/min.
Remote batch	\$20.00/min.	—	—	—	Not specified
Mass storage:					
Interactive	\$2.00/million bytes/day	\$10.00/2000 chars./month	\$0.75/1000 chars./month	\$0.30/330 digits/month	\$0.01/1000 chars./day
Remote batch	\$2.00/million bytes/day	—	—	—	Not specified
<b>COMMENTS</b>	Offers on-line and batch services based upon OS/360-370 & HASP, plus an interactive file editor (SDL/Wylbur) and data retrieval system (SDL/Info)	Offers specialized service for civil engineers and surveyors only; plotter available for \$45/hour	Offers services on ACTS system. \$50 initiation fee. Reduced rates for non-prime hours and volume usage	Main emphasis is on invoicing, accounts receivable, statistical reports, and inventory control; monthly charge includes CP and connect time	Provides access to TELPRICE/70, an extensive financial data base, at a cost of \$350/month



## All About Time-Sharing and Remote Computing Services

COMPANY	Time-Sharing Resources, Inc.	Tymshare, Inc.	Uni-Coll	United Computing Systems, Inc.	University Computing Company
<b>GENERAL</b>					
Name of service	Total-APL	TYMCOM IX, X, & 370	TSO and APL at Uni-Coll	UCS	1108/FASBAC services
Date operational	July 1970	1966	July 1970	Jan. 1968	May 1969
Areas currently served	Northeast and Southeast states, plus Texas, Arkansas, Oklahoma, & California	Local access in all major U.S. metropolitan areas, plus INWATS; local access in London, Paris, & Brussels	Delaware Valley	Major metropolitan areas nationwide thru network of multiplexers; national INWATS for remote batch; expanding to major Canadian cities	Entire U.S. (thru WATS and multiplexers), plus England, Western Europe and Australia
<b>EQUIPMENT</b>					
Computers	IBM 360/75 in Great Neck, N.Y.	Xerox 940 (26), DEC PDP-10 (6), & IBM 370/158 (1); in Cupertino, CA & other locations	IBM 370/168 & DECsystem-10 (K1) in Philadelphia	CDC Cyber 70 (3), CDC 6600, & CDC 6500 in Kansas City, Mo.	UNIVAC 1108's in Dallas (4), East Brunswick, N.J. (2), London (2), and Sydney
No. of simultaneous user	95	1500 total	110 total	Proprietary	FASBAC: 25 per system
Conversational terminals supported	IBM 2741 & equivalent units; all ASCII terminals	Any ASCII, EBCDIC, or Correspondence unit at 10, 15, or 30 cps, in full or half duplex mode	Any ASCII unit at 10, 30, or 120 cps; IBM 2741 & compatible units at 14.8 cps	Virtually all 10 to 30 cps terminals (120 cps in 1975)	ASCII, EBCDIC, & Correspondence units at 10, 15, or 30 cps
Batch terminals supported	IBM 2780, Data 100	IBM 2780 and compatible units	Any HASP-compatible RJE terminal	Data 100, DEC PDP-11, Mohawk 2400, Remcom, UNIVAC 1004, etc.	Any unit capable of operating in UNIVAC 1004 or COPE mode
<b>SOFTWARE</b>					
Conversational programming languages	APL	FORTRAN, BASIC, COBOL, PL/1, Assembler, Editor	APL & TSO on IBM 370/168, FORTRAN, BASIC, COBOL, ALGOL, APL on DECsystem-10	FORTRAN, BASIC, Editor	CASH, CALC, SHOBOL, Fastext
Batch-mode programming languages	FORTRAN, COBOL, BASIC, APL, PL/1, Assembler	—	FORTRAN, COBOL, PL/1, RPG, Assembler on IBM 370/168	FORTRAN, BASIC, COBOL, ALGOL, Compass, Simscript	FORTRAN, COBOL, ALGOL, Assembly
Principal applications	Business & scientific	Business & scientific	Academic, scientific, administrative	Business & scientific	Business & scientific
<b>CHARGES</b>					
Min. monthly charge:					
Interactive	None	\$80	None	\$100	None
Remote batch	None	—	None	\$100	None
Terminal connect time:					
Interactive	\$11.00-19.00/hr.	\$16.00/hr.	\$3.60/hr. (168)	\$10.50-37.50/hr.	\$8.50-11.00/hr.
Remote batch	\$120.00/hr.	—	None	\$10.00-30.00/hr.	\$3.00/hr.
Central processor time:					
Interactive	\$31.20/min.	\$0.05/sec.	\$45.00/min. (168)	\$1.50-36.00/min.	\$1.10/1000 CRU's
Remote batch	—	—	\$27.00-58.50/min.	\$9.60-33.60/min.	Not specified
Mass storage:					
Interactive	\$10.00/million bytes per day	\$0.50-1.00/1000 chars./month	\$0.02/13,000 chars./day	\$0.50/1280 chars./month	\$1.00/2048 chars./month
Remote batch	—	—	\$0.02/13,000 chars./day	\$50.00/204,800 chars./month	\$0.14/7K 36-bit words/day
<b>COMMENTS</b>	Total-APL File Sub-system facilitates processing of large shared files and data bases; also offers financial modeling system and stock data base system called Impact	Charges shown are for Type A service on Xerox 940; other service plans are available; operates an extensive international network called TYMNET; over 1250 employees	Offers System/370 RJE, TSO, & APL services and DECsystem-10 time-sharing services to educational and commercial customers	Offers variety of pricing options and 4 levels of service: time-sharing, remote batch, RJE (batch job entry from TS environment), and local batch	Principal emphasis is on remote batch processing; FASBAC is an interactive batch system, offered at a maximum hourly rate of \$17/hr.

All About Time-Sharing and  
Remote Computing Services

COMPANY	USS Engineers and Consultants, Inc.	Wang Computer Services	Westinghouse Tele-Computer Systems Corp.	Xerox Computer Services
<b>GENERAL</b>				
Name of service	UEC	HASP-RJE, WYLBUR, SPARK	Remote Input Terminal System	Interactive Accounting System
Date operational	May 1970	Nov. 1968	Nov. 1968	1970
Areas currently served	Pittsburgh, Phila., New York, Houston, Chicago, Detroit, & 5 other cities in the Midwest	HASP-RJE; New England; WYLBUR & CICS: Northeast; SPARK: all of U.S. via remote multi- plexers	Middle Atlantic & New England States plus Illinois, Ohio, & Michigan	Los Angeles, San Francisco, San Diego, and New York metropolitan area
<b>EQUIPMENT</b>				
Computers	CDC 6500 (dual central processors), Honeywell 6800 in Pittsburgh	IBM 370/158 & 360/65 in Arlington, Mass.	IBM 370/165, CDC 6600	Xerox Sigma 7 & 9 (7 sys- tems) in Los Angeles
No. of simultaneous users	Not specified	Over 150 per system	32/system	Not specified
Conversational ter- minals supported	TTY 33/35, GE Termi- Net 300, Datapoint 3300, Syner-Data, Incoterm	TTY; CRT displays; IBM 2741, 3741, S/360 & S/370 computers; Wang 2200	Various terminals at 10, 15, or 30 cps	TTY 35, IBM 2741, Datel Execuport, Olivetti
Batch terminals supported	CDC 1700, CDC 200, IBM 1130, Incoterm	Data 100; IBM 2780, 3780, S/360 & S/370 computers (to 9600 bps)	IBM 360 & 370 com- puters, IBM 2770 & 2780, CDC 200, etc.	—
<b>SOFTWARE</b>				
Conversational pro- gramming languages	FORTRAN, COBOL, BASIC, ALGOL	FORTRAN, BASIC, Assembler	—	Proprietary "Plain English" language acti- vates standard Xerox programs
Batch-mode program- ming languages	FORTRAN, COBOL, BASIC, ALGOL	FORTRAN, BASIC, COBOL, PL/1, RPG, Assembler	FORTRAN, COBOL, PL/1, APT	—
Principal applications	Business & scientific	Business & scientific	Business & scientific	Business
<b>CHARGES</b>				
Min. monthly charge:				
Interactive	None	None	—	\$1,000
Remote batch	None	None	None	—
Terminal connect time:				
Interactive	None	\$6.00/hr.	—	See Comments
Remote batch	None	None	None	—
Central processor time:				
Interactive	\$24.00/min.	\$4.00-34.50/min.	—	See Comments
Remote batch	Rates on request	\$4.00-34.50/min.	See Comments	—
Mass storage:				
Interactive	\$1.00/10,000 chars./month	\$12/cylinder/month	—	\$1.40/1000 chars./month
Remote batch	Rates on request	\$12/cylinder/month	\$0.02/5760 chars./day	—
<b>COMMENTS</b>				
	Subsidiary of U.S. Steel Corp.; lower rates for batch mode and volume usage; surcharges for certain software	CPU charges vary with storage region size (2K to 600K bytes) and priority; surcharges for certain software	Emphasizes remote batch processing; prices depend upon system, type of port, and monthly volume	Offers integrated on-line accounting system; charges are based upon transac- tions entered, storage used, and lines printed; all pro- gramming is done by Xerox

# All About Time-Sharing and Remote Computing Services

## AVAILABILITY OF APPLICATION PROGRAMS

<div>APPLICATION</div> <div>COMPANY</div>	Accounts payable	Accounts receivable	Banking	Billing	Data base management	Educational	Engineering	General ledger	Hospital administration	Information retrieval	Insurance	Inventory control	Numerical control	Operations research	Payroll	Personnel	Project control	Sales analysis	Scheduling	School administration	Scientific	Simulation	Statistical	Text editing	Typesetting
ACTS Computing Corporation Aeronutronic Ford CSN APL Services, Inc. Applied Computer Timesharing Applied Data Processing, Inc.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Applied Logic Corporation Aquila BST Limited Beloit Computer Center, Inc. Boeing Computer Services, Inc. Bowne Time Sharing, Inc.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Chi Corporation Community Computer Corporation Compudial, Inc. Compu-Serv Network, Inc. Computel Systems Limited	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
The Computer Company, Inc. Computer Innovations Computer Network Corporation Computer Research Company Computer Resource Services, Inc.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Computer Sciences Canada, Ltd. Computer Sciences Corporation Computer Sharing Services, Inc. Computer Spectrum Computility Division, Call Data Systems	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Computone Systems, Inc. Comshare, Incorporated Comshare Limited Control Data Corporation Cybershare Limited	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cyphernetics Division, ADP, Inc. Data Resources Inc. Data-Tek Corporation Datacrown Limited Dataline Systems Limited	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Datalogics, Inc. Dialcom, Inc. Distrionics, Inc. (Western Union) Financial Data Systems First Data Corporation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Fulton National Bank General Electric Company Genesee Computer Center, Inc. Grumman Data Systems GTE Data Services Incorporated	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
HDR Systems, Inc. Honeywell Information Systems, Inc. Information Systems Design Interactive Data Corporation Interactive Sciences Corporation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

All About Time-Sharing and  
Remote Computing Services

## AVAILABILITY OF APPLICATION PROGRAMS (Continued)

<div>APPLICATION</div> <div>COMPANY</div>	Accounts payable	Accounts receivable	Banking	Billing	Data base management	Educational	Engineering	General ledger	Hospital administration	Information retrieval	Insurance	Inventory control	Numerical control	Operations research	Payroll	Personnel	Project control	Sales analysis	Scheduling	School administration	Scientific	Simulation	Statistical	Text editing	Typesetting
International Timesharing Corporation Intel Corporation Data Services Kaman Aerospace Corporation Keydata Canada Keydata Corporation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Management Systems Corporation Manufacturing Data Systems, Inc. Mark/Ops Martin Marietta Data Systems McDonnell Douglass Automation Co.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Mellonics Information Center (Litton) Metridata Computing, Inc. Multiple Access Limited National CSS, Inc. Newfoundland & Labrador Computer Svc.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
NLT Computer Services Corp. Ohio Valley Data Control, Inc. On-Line Business Systems, Inc. On-Line Systems Inc. Pacific Applied Systems, Inc.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Paden Data Systems, Inc. Polycom Systems Limited PRC Computer Center, Inc. Programs & Analysis Inc. Proprietary Computer Systems, Inc.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pryor Corporation Rapidata, Inc. Remote Computing Corporation Scientific Process & Research, Inc. Scientific Time Sharing Corp.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
The Service Bureau Company Shared Medical Systems, Inc. I.P. Sharp Associates Limited Standard Information Systems, Inc. Statistical Tabulating Corporation	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Structural Dynamics Research Corp. Systems Dimensions Limited Technical Advisors, Inc. Technology for Information Management Tel-A-Data, Inc.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Telstat Systems, Inc. Time Sharing Resources, Inc. Tymshare, Inc. Uni-Coll United Computing Systems, Inc.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
University Computing Company USS Engineers and Consultants, Inc. Wang Computer Services Westinghouse Tele-Computer Systems Xerox Computer Services	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•



# All About Alphanumeric Display Terminals

Alphanumeric display terminals are becoming increasingly important tools in a broad range of modern business and industrial environments. These versatile devices have found their way into innumerable applications, many of which were once solely dependent on teleprinters as the only available cost-effective vehicle for interactive data communications. As an alternative to the teleprinter, alphanumeric display terminals provide numerous features that transcend those of the most sophisticated teleprinters. But by the very essence of the design of these terminals, the displayed data is characterized by evanescence, a crippling limitation to prospective users who need a hard-copy record—or who insist on indulging themselves in the security blanket of hard copy. For those who occasionally need hard copy, this disadvantage can easily be offset by the addition of an ancillary printer (at added cost) that produces hard copy on demand.

The current market offers a broad variety of alphanumeric display terminals, ranging from the so-called “dumb” terminals with rock-bottom prices of less than \$75 per month to programmable units ranging upward from several hundred dollars per month. Some of the more sophisticated terminals are built around minicomputers with as much as 32K bytes of memory, are supported by stored programs, and offer a host of peripheral devices including disk and tape drives, diskette and cassette drives, printers, card readers, and punched tape readers and punches. These top-of-the-line terminals are actually small computer systems designed to function in a distributed processing environment.

## New Technology

Many display terminal vendors are responding to the exploding semiconductor market by replacing conventional hard-wired controller logic with state-of-the-art microprocessors and semiconductor memories. By implementing the new technology, the vendor cuts production costs, adds intelligence, and safeguards against creeping obsolescence. In most cases, the new architecture is transparent to the user. But some vendors permit users to submit their own parameters for the controlling microprogram (firmware). Still other vendors permit the user to generate his own microprogram, thereby satisfying the demands of his immediate application. The user should be advised, however, that at this time microprocessors generally do not provide the flexibility and capability of minicomputers.

Alphanumeric display terminals, the subject of this report, are designed principally to display messages composed of alphanumeric characters, although a limited graphic capability may be an added feature. Alphanumeric terminals are attracting most of the attention and generating most of the revenue in the current display market. Graphic display terminals, which are covered in a

**This comprehensive report provides detailed specifications of 154 alphanumeric display terminals from 70 vendors, presents the results of an extensive user survey covering more than 13,000 installed terminals, and offers practical guidelines for selecting a display terminal that will meet your specific needs.**

separate DATAPRO 70 report (70D-010-91), account for only a small portion of the overall market.

Until quite recently the CRT (cathode ray tube) was virtually the sole means for displaying dynamic visual information, for business as well as entertainment use (in commercial television). Other devices for displaying information are now gaining popularity. These non-CRT devices include LED's (light emitting diodes, such as those used in calculators), plasma (gaseous) displays (such as the Burroughs Self-Scan panel), liquid-crystal displays, etc. But CRT displays still dominate the display industry, because they are still by far the cheapest method for displaying large amounts of data. Solid-state displays, such as those mentioned above, are currently limited to displays ranging from a few characters to a line of some two or three dozen characters (although Burroughs uses its Self-Scan panel to display up to 256 characters in an 8-line by 32-character format in its TD-700 unit). Because of their prohibitive costs for displaying large quantities of data such as the 2000-character displays in current use, solid-state displays are still a long way from replacing the ubiquitous CRT.



*Brand new from Hewlett-Packard, and with all the bells and whistles, the microprocessor-based 2640A includes up to 8K bytes of memory that stores up to 3 full pages of data for display on its 1920-character screen. Incidentally, 2640 is also the terminal's price tag for an order of 6 units.*



## All About Alphanumeric Display Terminals

➤ IBM's new communications discipline, Synchronous Data Link Control (SDLC), introduced as an integral component of its "Advanced Function for Communications" in September 1974, is likely to become a de facto industry standard for future data communications terminals. SDLC is an improved form of communications discipline for higher transmission efficiency. IBM has already introduced a number of specialized and general-purpose terminals that use the new communications protocol, and has upgraded its 3270 Information Display System to provide the capability as an alternative to the BSC (binary synchronous) discipline.

Vendors who sell directly to the IBM market have already been impacted by the introduction of SDLC. Obviously, these vendors will have to incorporate SDLC compatibility in order for their products to remain viable in the future. Many are already in the process of doing this, while others are planning to be compatible with IBM's SDLC by the end of 1975 or early 1976. Vendors whose products are microprocessor-based can provide SDLC compatibility at any time in the future by merely changing the microprograms that control the units' operations. Vendors whose market is the low-speed (asynchronous) Teletype-compatible environment need not concern themselves with SDLC in the immediate future, but they may at some time need to respond to IBM's 3767 and 3770 series typewriter terminals, which can operate with SDLC.



*The smooth-looking ICC 40+, a Teletype Model 40 replacement, is the initial entry into the alphanumeric display market by ICC/Milgo, a leading modem vendor. Configuration flexibility permits the CRT to be mounted above the keyboard or to stand alone as shown above. The CRT can be tilted and swiveled for operator viewing convenience.*

### Market Contention

Since 1965, when the first commercially available alphanumeric display terminals were introduced, dozens of display terminal vendors have appeared on the scene. Many have already stumbled and fallen by the wayside; others have survived to become today's major display vendors. Still others seek a place in the crowded display terminal market that is already amply supplied by leading mainframe manufacturers and by large independents such as Hazeltine and Sanders. All these companies, new and old, obviously believe that a vast market exists for alphanumeric display terminals.

What is the nature of this market? To what extent have display terminals impacted computer users? Do they represent a panacea for all computer input/output problems? What do their users think of them? Should you be using them? And if so, which of the many available models represents the best overall choice for you? This report attempts to answer these questions by clearly and comprehensively describing the characteristics of today's alphanumeric display terminals and their role in data communications environments. The current offerings of 70 vendors are summarized in the accompanying comparison charts, and the experience of almost 400 users with over 13,000 CRT terminals is reported in clearcut form. This year's user survey response, incidentally, was substantially greater than last year's response of 268 users reporting on 7,800 terminals.

### Industry Profile

The computer terminal market is one of the fastest-growing segments of the computer industry. The total number of terminals in use skyrocketed from a mere 50,000 in 1965 to an estimated 1.5 million by the end of 1974—a 30-fold increase over the course of a decade. And the market is still young. Projections place the total installed base toward the end of the 1970's at about 2.5 million terminals, unless affected by a lingering industry slowdown.

The total data terminal business for 1974 was valued at \$1.3 billion, representing a 24 percent gain over 1973. The if-sold value of classical, non-intelligent alphanumeric display terminals shipped in 1974 was estimated at \$245 million, a 12 percent gain over 1973. The growth of sales for all types of terminals is expected to slow in 1975, but still show a gain over 1974 of 5 to 15 percent. Sales will probably gain momentum again in 1976 and the later years of the 1970's. By 1980, the annual value of equipment sold should be more than twice the 1974 figure.

The classical display terminal will not match the growth of the overall terminal market. But that does not mean that display terminals are going into eclipse. Substantial markets are opening for intelligent terminals, key/disk data entry systems, point of sale (or transaction-oriented) systems, banking teller terminal systems, etc. By 1980,

## All About Alphanumeric Display Terminals

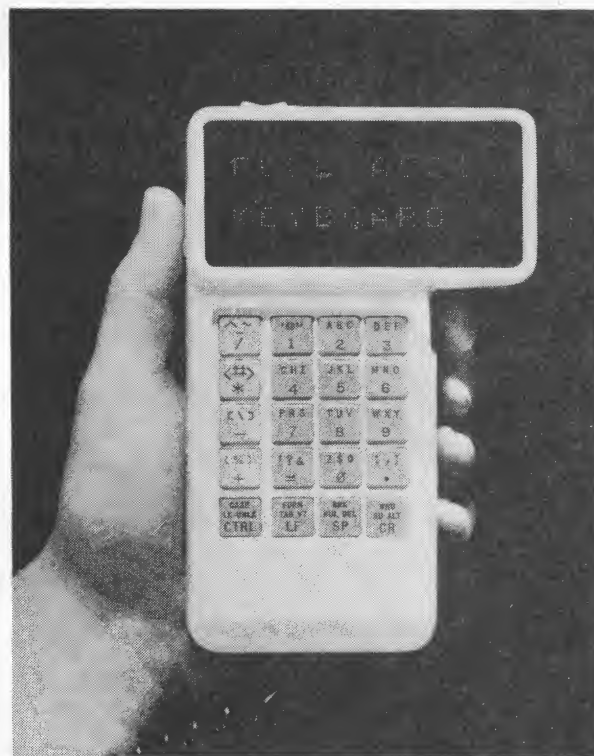
intelligent terminals will probably represent one-quarter of the total terminal market referenced above. Also by 1980, POS and banking terminal systems may represent a market roughly half the size of the general-purpose terminal market above. Some portion of these markets will involve display terminals.

Thus, the display terminal is rapidly becoming a component as well as a final end-user product. Precise market estimates may be difficult to make because of this change, but one thing is clear: the convenience and glamour of displayed data will play a prominent role in the design of new information handling systems of all types.

### Display or Teleprinter?

Not all applications are best served by alphanumeric display terminals. Though they are not as glamorous as their "glass" counterparts, teleprinters can best satisfy applications where minimum cost and/or a fully justified need for printed copy are the criteria. Before selecting an alphanumeric display terminal over a teleprinter, you should consider the following key factors:

- **Cost**—Teleprinters in general are priced substantially below most display terminals. Based on current costs, few display terminals can compete with the rock-bottom costs of many teleprinters (especially Teletypewriters), though the average unit cost of display units continues to shrink as the result of large-scale integration and high-volume production techniques.
- **Output medium**—Teleprinters provide a permanent record of important data, and the copy can be formatted according to user needs. Single copies can be filed for ready access or circulated to satisfy individual needs. Multiple copies can be produced for wide distribution. Printed copy can also be used for OCR input, provided that it is printed in an OCR-readable font. Display terminals provide faster, more convenient access to required information, and can usually be equipped with ancillary printers to produce hard-copy records of the displayed data when required.
- **Operating speeds**—Teleprinters are generally far slower in operation than their counterpart display terminals. Typical print speeds range from 10 to 30 characters per second for most teleprinters (though a few are capable of 120 cps or even higher speeds). Typical display speeds range from 300 to 1200 characters per second. Operating speeds this high, however, are simply not warranted in many applications, though they can sometimes lead to savings in communications line costs. On the other hand, line costs for teleprinters can be considerably reduced through buffering, which divorces printer operation from the communications medium and permits data to be transmitted at speeds up to 9600 bps.



*Designed for data entry/display applications where the operator should not be confined to a chair, this hand-held display unit produced by Termiflex displays one or two 10-character lines using LED's (light emitting diodes). A 500- or 1000-character memory provides a scrolling capability, i.e., sequential display of 10-character line segments on command. The three-level keyboard can generate a full ASCII character set. A cord, just visible against the dark background, connects the display unit with the communications or I/O channel interface.*

- **Editing, data entry, and formatting**—Teleprinters are designed primarily for data communications, and they generally do not provide sophisticated capabilities for editing, data entry, or data formatting. When implemented, editing is usually limited to a single line (the one just keyed) unless the teleprinter includes a cassette tape unit, which can significantly enhance the edit capability. Though display terminals have popularized the "fill-in-the-blanks" concept, data entry applications that require the use of fixed formats are not restricted to display devices; at least one teleprinter vendor (Texas Instruments) has implemented the concept (on its Model 742) via the use of user-recorded formats on cassette tape. TI also provides validation software. Sophisticated capabilities such as editing and data entry, however, drive up the costs of teleprinters in competition with display terminals, and unless there is a definite requirement for printed copy, a display terminal will usually be the better buy. Formatted output is featured on some printers, but again the cost is driven upward.
- **Reliability**—Most of the current teleprinters are reasonably reliable devices, but like all mechanical

## All About Alphanumeric Display Terminals

devices they are subject to wear and misalignment. Display terminals offer generally higher reliability as a result of their totally electronic operation.

### Major Display Markets

Excluding specialized terminals for dedicated markets such as brokerage houses and financial firms, the alphanumeric display terminal industry has focused its attention on three principal markets: Teletype replacement, IBM 3270 and 2260 replacement, and programmable terminals.

The most active of these three markets has been, and will probably continue to be, that of Teletype replacement, because it represents the greatest profit potential for the small terminal manufacturers.

Replacements for the IBM 2260 have reached their peak of market penetration and are now offered by most independents on an "as available" basis. The IBM replacement industry is now directed mainly toward 3270 replacements.

Programmable ("intelligent") terminals promise to capture both the older IBM 2260 and newer IBM 3270 replacement markets by virtue of their software emulation capability. The key marketing advantage of the programmable terminals is their capability to emulate virtually any terminal through microprogram control. These versatile terminals are thus less vulnerable to obsolescence. In addition, many of the programmable terminals can be equipped with extensive complements of peripheral equipment and can effectively perform a wide variety of local data editing, formatting, and processing functions.

### IBM's Best-Seller, the 3270

The IBM 3270 has strongly impacted the alphanumeric display terminal market since deliveries began late in 1971. Representing a significant price/performance improvement over its forerunner, the IBM 2260, the 3270 continues to carve a sizeable slice of the marketplace. Priced well below the 2260, the 3270 features expanded functional capabilities, such as twice the display capacity of the 2260 and increased transmission and printing speeds. It also provides sophisticated operating capabilities, such as program-controlled formatting, program function keys, and more sophisticated commands. But the 3270 is not a direct replacement for the 2260. Thus, IBM computer users must consider fairly extensive software conversions in order to switch from the 2260 to the 3270.

Recognizing the complexity involved in replacing existing 2260 installations with 3270's, the independents introduced attractive alternatives—2260 replacement terminals that provide compatibility with existing 2260 operating software but offer 3270-like features, such as a large screen size, flexible cluster configurations that can accommodate multiple printers, faster printers, editing

capabilities, increased transmission speeds, etc., all at substantial cost savings over the prices of either the IBM 2260 or 3270 displays. The more prominent of these independents were Courier, Delta Data Systems, GTEIS, ITT, and Trivex. Meanwhile, these and other independents began to direct their attention to the development of 3270 replacement terminals.

IBM discouraged the continued use of the 2260 by not supporting it under new communications software packages such as the Network Control Program (NCP), used with the 3704 and 3705 Communications Controllers, and VTAM, the principal access method for telecommunications support under DOS/VS and OS/VS, when these facilities were announced. However, both the 3704 and 3705 Communications Controllers continue support for the 2260 under the Emulation Program, which furnishes the capability of a 270X hard-wired controller. There are also indications that IBM will insert support for 2260's under the full System/370 operating software. Although IBM is clearly directing its support away from the System/360 market, the independents are determined to keep it alive. And IBM has reinstituted support for the 2260 under the latest versions of its data communications monitor (CICS) and data base management system (IMS) for the 370 family.

A number of independent vendors have introduced direct replacements for IBM's 3270 Information Display System. Among these are Computer Optics, Courier, Four-Phase Systems, Genesis One, GTEIS, Incoterm, Raytheon, Sanders, Sycor, Terminal Communications, and Trivex. Other vendors whose products are microprogrammable can also provide IBM 3270 compatibility. Still others will enter the market in the coming months. As one might expect, the independents are offering more than just substantial price reductions. Enhancements include additional screen sizes, increased configuration flexibility, greater printing capabilities, data validation via user programs, display enhancements, etc. Not all these enhancements are offered for the same terminal, so users should examine each product separately for those characteristics that satisfy the needs of their specific applications.

### IBM in Retrospect

IBM announced its intention to enter the alphanumeric display terminal market during the early years and in 1966 introduced the 2260 Display Station, a clustered terminal accommodating as many as 24 individual CRT displays that could be used at the central computer site or at a remote site via a communications facility. With its introduction of the 2260, IBM placed its stamp of approval on display terminals as a practical medium for data entry and set the stage for a viable display terminal industry by establishing the initial parameters.

Because IBM has long dominated the computer industry, it follows that IBM should also dominate the display terminal industry. It does. IBM followed the 2260 in 1967



## All About Alphanumeric Display Terminals



The Zentec 9002 is one of a new breed of terminals by relative newcomers to the display terminal market. This user-programmable terminal features microprocessor control, up to 16K bytes of memory (including ROM, PROM, and RAM), a 1920-character screen, and a detachable keyboard.



Digital Equipment's attractive VT50 DECscope, introduced in September 1974, features a 960-character screen with typewriter-style keyboard and an integral non-impact hard-copy device (not visible). Its low price of \$1,250 (in unit quantities) makes it a formidable competitor for the Teletype replacement market.

by introducing a single-tube version, the 2265, which was designed for communications only. Since both terminals communicate with the IBM System/360 computers and are supported by IBM software, their growth has been generally proportional to the increasing number of System/360 installations. The 2260 and 2265 reigned as IBM's sole display terminals until mid-1971, when IBM announced the previously discussed 3270 Information Display System as a more sophisticated and less expensive replacement.

The principal weaknesses of the IBM 2260 and 2265 were small display capacity, lack of an editing capability, a rather crude and inflexible fixed-format capability, a very limited hard-copy capability, and last, but by no means least, high unit cost. Products of vacuum-tube technology, the IBM 2260 and 2265 are now clearly obsolescent though still widely used. As display terminals produced by other terminal makers became more sophisticated, reflected by the advancing state of the art, the IBM terminals began to look conspicuously dated.

### Enter the Independents

It did not take the independent manufacturers long to recognize the fact that a ripe replacement market existed. Several companies began to produce and market CRT display terminals designed to replace the IBM 2260 and 2265 displays at substantial dollar savings. Most featured enhancements such as larger display capacities, edit and format handling features, provision for handling several printers operating in local and/or remote modes, and other noteworthy capabilities. Most of these enhancements require some alterations to the IBM communications software, but these can generally be implemented by a minor partial sysgen to write the new operating parameters.

Producing a cheaper and better substitute for IBM's display terminals became easier as time passed as a direct result of large-scale integration, the use of semiconductor memories, and the infusion of low-priced keyboards. However, all is not sunshine and roses; early installations of IBM-replacement displays have frequently experienced lengthy debugging periods during which all kinds of problems arose, ranging from simple to complex. In some cases, hardware proved to be unreliable; in others, timing problems existed. The former may be resolved by component changes; the latter may require more extensive changes because they involve the timing of the exchange of information and commands between computer and display terminal. Datapro has found, as a result of conversations with many users, that during the installation and debugging period, a good many of the independent manufacturers have demonstrated a high degree of overall competence and are quick to respond to the users' needs.

### The Teletype Replacement Market

While some of the independents pursued the IBM replacement market, others chose to take on Teletype. This is by no means an easy task when you stop to consider that the outright purchase price of a Teletype Model 33 ASR is less than \$1,000 and that a KSR costs about half as much. But the independents were offering more than just a CRT in place of a printer. The Model 33, as you probably know, is a limited-usage machine, supposedly good for about four hours per day. Its heavy-duty equivalent, the Model 35, carries a price tag about three times as high. Both machines provide limited transmission rates of 10 characters per second. And what about paper tape? It's cheap but crude compared with the use of magnetic tape cassettes. These limitations provide the prime incentives for teletypewriter replacement.

## All About Alphanumeric Display Terminals

➤ CRT terminals can compete with the price of the Teletype Model 35 and provide the kind of equipment reliability required for continuous usage by virtue of the use of electronic components. In addition, CRT terminals can offer transmission speeds that are limited only by the inherent capacity restraints of the communications facility. Many of the Teletype-compatible CRT terminals offer a range of switch-selectable speeds from 10 to 240 characters per second. Other features, such as an edit capability and the transmission of message blocks, can be considered as gravy. To satisfy specific user needs, such as occasional printed output and a recording medium for on- or off-line operation, many vendors supply low-priced, nonimpact printers and magnetic tape cassette recorders.

### The Teletype Model 40

While the independent CRT manufacturers were busy replacing Teletype terminals, Teletype Corporation witnessed steadily declining revenues—a strong impetus that forced Teletype to change its image from that of an old-line supplier of low-speed, message-oriented equipment to that of a sophisticated terminal manufacturer. Though long dedicated to the production of teleprinters and punched tape equipment, Teletype gained experience with CRT terminals in the late 1960's, when development began on communication display terminals for AT&T in-house applications such as order entry.

Teletype's impressive display terminal, the Model 40, was unveiled in May 1973. The unit was offered on a purchase-only basis by Teletype, a subsidiary of AT&T's Western Electric Company, and as the Dataspeed 40 Service, a tariffed service offered by AT&T and its Bell System operating companies.

The joint introduction of the Teletype Model 40 and AT&T Dataspeed 40 Service spread waves of apprehension that penetrated the very foundation of the communications terminal industry, largely composed of small, independent manufacturers. The Model 40 offers an impressive collection of capabilities and features at very competitive prices. With AT&T's backing, it can be expected to have a major impact upon the already-crowded CRT terminal market. Industry analysts have raised the possibility that Teletype and IBM may run up against one another, with the two giants competing for the large corporate customers who will be merging their data and message networks. Two years have passed since the introduction of the Model 40. Deliveries began in late 1973, and the large deliveries have been and will continue to be primarily to AT&T. Most users will be introduced to the Model 40 through the Dataspeed 40 service, a convenient way for acquiring terminals.

So convenient is this method of acquisition that independent vendors, sensitive to the marketing clout of large companies such as AT&T and IBM, have raised the spectre of unfair competition. And the Model 40 has become a new target for emulation. One company, ICC (the modem maker), has introduced a compatible

product, the 40+, with the now-typical characteristics of a terminal emulator: compatibility plus additional features. As the usage of the Model 40 grows, you can expect more imitators with more features to be introduced.

### User Experience

To assess the current level of user satisfaction with display terminals, and to determine the patterns of usage of these terminals, Datapro conducted an extensive user survey. A CRT Display Reader Survey Form was included in the January 1975 supplement to DATAPRO 70 and mailed to all subscribers. By March 1, usable responses had been received from a total of 398 users with a total of 13,460 installed display stations.

Because many of the users reported on more than one model of display, the user replies generated a total of 543 responses or individual equipment ratings and profiles. The orientation of the users participating in the survey can be shown by the following table:

Responses on:	Responses		Displays	
	Number	Percent	Number	Percent
IBM displays	229	42	6,606	49
Other displays	314	58	6,854	51
Total	543		13,460	

Overall, the average number of displays per response was 25.1, while the average number of displays per responding user was 33.8.

The users were asked to rate the overall performance, ease of operation, hardware reliability, maintenance service, and software and technical support for each display by assigning a rating of excellent, good, fair, or poor. The resulting ratings for 52 popular display models or families are summarized in Table I. Prospective buyers should note that the small sample sizes for some of these models make it unwise to draw firm conclusions from the indicated ratings.

To put the raw counts into a form more readily grasped, Datapro calculated a weighted average for each rating category. Each user response was assigned a weight of one, and the ratings were weighted on the conventional scale of 4, 3, 2, and 1 for excellent, good, fair, and poor, respectively. The data is presented as an additional information source, not as the final word on the worth of the displays represented.

The ratings assigned by the responding users can also be combined to form an overall picture of current user satisfaction with the IBM displays, other manufacturers' displays, and all displays:

## All About Alphanumeric Display Terminals

Table I. USERS' RATINGS OF ALPHANUMERIC DISPLAY TERMINALS

Display Supplier and Model	Number of User Responses	Number of Displays in Use	Weighted Averages and Response Counts																									
			Overall Performance					Ease of Operation					Hardware Reliability					Maintenance Service					Software and Technical Support					
			WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	
ADDS 580	3	14	3.3	1	2	0	0	3.3	1	2	0	0	3.3	1	2	0	0	3.0	1	1	1	0	2.7	1	1	0	1	0
ADDS 880	5	21	3.4	2	3	0	0	3.4	2	3	0	0	3.6	3	2	0	0	2.8	0	4	1	0	2.8	0	3	1	0	0
ADDS, others	2	5	3.0	0	2	0	0	3.0	0	2	0	0	3.5	1	1	0	0	3.0	0	2	0	0	3.0	0	2	0	0	0
Beehive, all models	10	85	3.1	3	5	2	0	3.3	4	5	1	0	3.1	4	3	3	0	2.4	0	4	3	1	2.7	1	4	4	0	0
Bell of Canada Vucom I	7	71	2.9	2	3	1	1	2.9	1	5	0	1	3.4	4	2	1	0	3.3	2	5	0	0	2.2	0	2	2		
Bunker Ramo 2200 Series	7	265	3.6	4	3	0	0	3.7	5	2	0	0	3.0	1	5	1	0	3.1	2	4	1	0	2.5	0	3	3	0	0
Burroughs TD 700	6	30	3.5	3	3	0	0	3.5	3	3	0	0	3.3	3	2	1	0	3.3	2	4	0	0	2.8	2	1	3	0	0
Burroughs TD 800	11	80	3.0	2	7	2	0	3.0	1	9	1	0	3.0	2	7	2	0	2.8	1	7	3	0	2.8	2	6	2	1	0
Burroughs, others	8	207	3.5	4	4	0	0	3.5	5	2	1	0	3.1	2	5	1	0	3.1	2	4	1	0	3.0	3	2	3	0	0
Control Data 700 Series	6	123	3.3	2	4	0	0	3.2	2	3	1	0	2.8	1	3	2	0	3.2	2	3	1	0	2.8	0	3	1	0	0
Courier 60/260/265	5	192	3.2	1	4	0	0	3.8	4	1	0	0	3.2	1	4	0	0	2.8	0	3	1	0	2.6	1	2	1	2	1
Courier 270	6	84	3.4	2	3	0	0	4.0	6	0	0	0	3.5	3	3	0	0	2.7	1	3	1	1	2.5	2	1	1	2	1
Courier, others	5	52	2.8	1	1	2	0	3.8	3	1	0	0	2.8	1	2	0	1	2.3	0	2	1	1	2.7	1	1	0	1	1
Data 100 term. console	4	4	3.5	2	2	0	0	3.8	3	1	0	0	3.5	2	2	0	0	3.3	1	3	0	0	2.3	0	2	0	1	1
Datapoint 3000 Series	8	19	3.1	3	3	2	0	3.3	3	4	1	0	3.3	4	2	2	0	3.0	2	4	2	0	2.7	1	3	3	0	0
Datapoint 1100/2200	2	7	3.5	1	1	0	0	3.5	1	1	0	0	3.0	0	2	0	0	2.5	0	1	1	0	2.5	0	1	1	0	0
DEC VT05	6	22	3.7	4	2	0	0	3.8	5	1	0	0	3.7	4	2	0	0	3.5	4	1	1	0	3.0	2	2	2	0	0
Four-Phase IV/70	14	231	3.2	3	11	0	0	3.4	5	9	0	0	3.3	5	8	1	0	2.6	1	6	7	0	2.4	2	3	8	1	0
Four-Phase, others	6	295	3.7	4	2	0	0	3.7	4	2	0	0	3.8	4	1	0	0	2.8	2	1	3	0	2.7	2	2	0	2	0
GTEIS 7000	3	130	3.7	2	1	0	0	4.0	3	0	0	0	2.7	0	2	1	0	2.3	0	2	0	1	2.0	0	1	1	1	0
GTEIS 7100	5	206	3.0	1	3	1	0	3.8	4	0	0	0	2.6	0	3	2	0	2.4	0	2	3	0	2.4	0	2	3	0	0
GTEIS 7700	13	351	3.4	5	8	0	0	3.6	8	5	0	0	3.1	3	8	2	0	2.8	3	5	5	0	2.7	1	8	3	1	0
GTEIS 7800	4	107	3.5	2	2	0	0	3.8	3	1	0	0	3.5	2	2	0	0	2.8	1	2	0	1	2.5	1	1	1	1	0
GTEIS, others	3	34	3.7	2	1	0	0	3.7	2	1	0	0	3.0	1	1	1	0	3.0	1	1	1	0	2.3	0	2	0	1	0
Hazeltine 1000	7	13	3.3	2	5	0	0	3.0	1	5	1	0	3.1	2	4	1	0	2.6	0	3	2	0	2.5	0	3	3	0	0
Hazeltine 2000	37	237	3.3	17	15	3	1	3.4	18	14	2	1	3.2	14	15	4	2	2.7	9	13	7	6	2.3	2	10	15	4	0
Honeywell 7700	3	73	3.0	0	3	0	0	2.7	0	2	1	0	3.0	0	3	0	0	3.0	0	3	0	0	1.3	0	0	1	2	0
Honeywell, others	5	273	2.8	1	2	2	0	3.2	2	2	1	0	2.6	1	2	1	1	2.8	1	2	2	0	2.6	1	1	3	0	0
IBM 2260	12	129	3.0	1	9	1	0	3.1	3	5	2	0	3.2	2	9	0	0	3.3	3	8	0	0	2.9	0	10	1	0	0
IBM 3275	35	303	3.5	20	12	3	0	3.3	12	20	3	0	3.5	20	10	4	0	3.3	15	14	6	0	2.8	7	15	9	2	0
IBM 3277	133	3,832	3.5	72	56	2	0	3.4	60	65	6	0	3.5	68	57	6	0	3.3	52	69	8	1	2.9	23	70	31	3	0
IBM 3270, others	49	2,342	3.4	21	27	1	0	3.4	21	27	1	0	3.3	22	22	5	0	3.3	20	23	5	1	2.7	8	20	17	3	0
Incoterm SPD 10/20	6	223	3.2	2	3	1	0	3.8	5	1	0	0	2.8	1	3	2	0	2.5	0	3	3	0	3.0	2	2	2	0	0
Infoton Vistar	3	38	4.0	3	0	0	0	3.7	2	1	0	0	4.0	3	0	0	0	3.0	2	0	0	1	3.0	1	1	1	0	0
Infoton Vistar G/T	3	27	3.7	2	1	0	0	3.3	1	2	0	0	3.3	1	2	0	0	3.0	0	3	0	0	3.0	0	2	0	0	0
ITT Asciscope	3	10	3.3	2	0	1	0	3.7	2	1	0	0	3.0	2	0	0	1	1.7	0	1	0	2	1.0	0	0	0	1	0
Lear Siegler ADM-1	4	18	3.5	2	2	0	0	3.5	2	2	0	0	2.8	1	2	0	1	3.3	2	1	1	0	3.0	1	1	1	0	0
Lear Siegler, others	4	68	3.5	2	2	0	0	3.5	2	2	0	0	2.8	1	1	2	0	2.8	0	3	1	0	2.8	1	1	2	0	0
NCR 796 Series	4	32	4.0	4	0	0	0	4.0	4	0	0	0	3.8	3	1	0	0	4.0	4	0	0	0	3.0	0	2	0	0	0
Research Inc. Teleray	3	29	3.7	2	1	0	0	3.7	2	1	0	0	4.0	3	0	0	0	2.7	1	1	0	1	2.0	0	0	2	0	0
Sanders 720	4	113	3.0	1	2	1	0	3.3	2	1	1	0	2.0	0	1	2	1	2.3	0	2	1	1	2.8	1	1	2	0	0
Sanders 804/810	5	54	3.0	0	5	0	0	3.4	2	3	0	0	3.0	2	1	2	0	2.6	0	3	2	0	1.8	0	0	4	1	0
Sycor 340	7	70	3.0	1	5	1	0	3.6	4	3	0	0	3.3	4	2	0	1	2.9	0	6	1	0	2.3	0	3	3	1	0
TEC, all models	4	453	3.5	2	2	0	0	3.5	2	2	0	0	3.3	1	3	0	0	3.3	1	2	0	0	2.8	1	1	2	0	0
Tektronix 4023	7	127	3.9	6	1	0	0	3.4	4	2	1	0	3.9	6	1	0	0	2.9	1	5	0	1	3.0	2	2	2	0	0
Teletype Model 40	5	257	3.8	4	1	0	0	3.8	4	1	0	0	3.6	3	2	0	0	3.2	3	1	0	1	3.2	3	1	0	1	0
Terminal Comm. TC-60	4	102	2.5	0	3	0	1	3.5	2	2	0	0	2.8	0	3	1	0	2.3	0	2	1	1	2.3	0	2	1	1	0
Terminal Comm. TC-62	4	126	3.3	1	3	0	0	3.5	2	2	0	0	3.3	1	3	0	0	2.8	0	3	1	0	3.0	0	2	0	0	0
Terminal Comm. TC-270	4	135	2.8	0	3	1	0	3.5	2	2	0	0	2.5	0	3	0	1	2.8	0	3	1	0	3.0	0	3	0	0	0
Univac Uniscope 100	10	668	3.6	6	4	0	0	3.6	6	4	0	0	3.5	6	3	1	0	3.5	6	3	1	0	2.8	1	7	1	1	0
Wyle 8000 Series	6	87	3.0	1	4	1	0	3.2	1	5	0	0	2.5	0	3	3	0	2.8	1	3	2	0	2.3	0	1	2	0	0
All Others	23	986	3.2	9	11	2	1	3.4	11	10	2	0	2.8	6	8	6	2	2.9	7	7	2	4	2.7	5	6	3	4	0
IBM Totals	229	6,606	3.5	114	104	7	0	3.4	96	117	12	0	3.4	112	98	15	0	3.3	90	114	19	2	2.8	38	115	58	8	0
Independent Totals	314	6,854	3.3	126	158	23	4	3.5	161	134	14	2	3.1	113	140	45	11	2.9	66	147	65	23	2.6	43	110	93	31	0
GRAND TOTALS	543	13,460	3.4	240	262	30	4	3.4	257	251	26	2	3.3	225	238	60	11	3.0	156	261	84	25	2.7	81	225	151	39	0

LEGEND: Weighted Average (WA) is based on assigning a weight of 4 to each user rating of Excellent (E), 3 to Good (G), 2 to Fair (F), and 1 to Poor (P).



## All About Alphanumeric Display Terminals

### ➤ IBM Displays

	Excellent	Good	Fair	Poor
Overall performance	51%	46%	3%	0%
Ease of operation	43	52	5	0
Hardware reliability	50	43	7	0
Maintenance service	40	51	8	1
Software & technical support	17	53	26	4

### Other Displays

Overall performance	41%	51%	7%	1%
Ease of operation	52	43	4	1
Hardware reliability	37	45	14	4
Maintenance service	22	49	21	8
Software & technical support	15	40	34	11

### All Displays

Overall performance	45%	48%	6%	1%
Ease of operation	48	47	5	0
Hardware reliability	42	45	11	2
Maintenance service	30	49	16	5
Software & technical support	17	45	30	8

As you can see from these figures and Table I, users rated the IBM and the other (non-IBM) displays as essentially equivalent in ease of operation, while awarding IBM a clear-cut advantage in the other four rating categories. Both IBM and the independents scored higher in this year's survey than in last year's. While the software and technical support ratings improved this year, both IBM and the independents still have lots of room for further improvement in this area.

The users were also asked questions designed to determine usage patterns for display units. The results can be summarized as follows:

Manner of use	Number of user responses	Percent of total
Remotely, via communications lines	355	65
Locally, directly connected to a computer	336	62
Single station, stand-alone	231	44
Clustered	255	47
Programmable	57	10
Structured data entry, a la keypunch	77	14
Fill-in-the-blanks formatted data entry	315	58
Free-form (text) data entry	182	34
Extensive editing	261	48
Little or no editing	152	28

### Buying Guidance

In selecting a display terminal, as in acquiring most other types of computer equipment, your chances of picking the unit that's best for your installation will be far greater if you're willing to take the time to go about it in a systematic, logical way. The following selection procedure should help you get the maximum gain in computer throughput per dollar spent.

1. *Define the essential parameters* for a display terminal that will satisfy your needs; then, using Tables II through VI, select the features that meet the requirements of your application.
2. *Find out who supplies the terminals* with the parameters and features you have selected. Use the accompanying comparison charts to determine which manufacturers produce terminals that appear to satisfy your needs. Then check the User Experience section of this report to see how users rate each manufacturer's products. You'll probably be able to narrow down the list of potential suppliers to a few firms that have demonstrated their ability to supply and service, at competitive prices, the specific type of terminal you need.
3. *Check the maintenance provisions.* Since maintenance is one of the key differentiating factors among the independent suppliers, you'll want to pay especially careful attention to this important area. Find out what organization supplies the maintenance service and learn all you can about it. Check the total size of the organization, the location and staffing of the closest service point, the promised response time for emergency service, the hours during which service is available, the nature and frequency of preventive maintenance, the size and location of the spare parts inventory, the procedure for handling engineering change orders, and the scope of the supplier's training program for his service technicians.
4. *Talk to users.* The terminals that appear most promising at this point should now be further investigated by conferring with present users. The user's ratings given in this report should serve as a first cut. Then ask each supplier for a list of customers. Be selective. Ask for installations similar to the one you're planning, at least with respect to communications discipline and number of terminals. And don't take no for an answer. Then, find out all you can from each user. Ask why he chose that unit, when it was installed, what problems were encountered in installing it, how many failures have occurred, how quickly they were corrected, and whether any incompatibilities have been detected. Finally, ask how he thinks the terminal or the associated support could be improved. The answers to these questions are likely to be highly enlightening, not only about the display terminals but about mainframe support as well.

## All About Alphanumeric Display Terminals

5. *Choose the vendor and model.* By now, you should have all the information you'll need to choose the terminal that will satisfy your requirements at the lowest overall cost. If so, it's just about time to place your order.
6. *Negotiate a sound contract.* Now that you know which terminal you want, don't just sign the supplier's standard contract or order form. If you do, you're likely to end up with a lot less security and support than the user who's willing to take the time and trouble to indulge in some old-fashioned haggling. What's more, you may even be able to shave some more dollars off the price tag.

### Display Terminal Characteristics

The accompanying comparison charts summarize the characteristics of 154 commercially available alphanumeric display terminals from 70 vendors. Nearly all of the information was supplied by the manufacturers during the months of February and March 1975. Their cooperation is acknowledged and greatly appreciated.

Datapro sent repeated requests for information to more than 80 companies known or believed to be in the display terminal business. The 70 usable responses summarized in our charts provide a comprehensive picture of the commercial display terminals that are currently available in the United States and Canada. *The absence of any specific company from our charts means that the company either failed to respond to our repeated information requests or was unknown to us.*

The chart entries and their significance are explained in the following paragraphs.

### Arrangement

Display terminals are available in one of two basic terminal configurations, *stand-alone or cluster*. Stand-alone units are typically those that contain all components that support the operation of the terminal, including display, keyboard, and interface, within a single cabinet. (Auxiliary units such as printers, cassette tape recorders, etc., are usually external devices.) Sometimes a stand-alone unit includes separate cabinets for terminal control and keyboard/display portions, and it may even include one or two separate displays.) A cluster configuration typically includes a terminal control unit and a number of individual, cable-connected keyboard/display units, sometimes located several thousand feet from the controller. In some cases the vendor provides a multiplexer that accommodates a cluster of stand-alone terminals.

Terminals that are designed to be hand-carried in a suitcase-like enclosure are noted by the entry *portable case*.



*Designed around a minicomputer, Computek's Model 200 is user-programmable and includes extensive software support. The unit features three screen sizes of up to 2000 characters, and 1K to 16K bytes of memory including ROM and RAM. Peripherals include single or dual cassette and diskette units, printers, card reader, and light pen. A diagnostic test set is shown at the upper left.*

Datapro defines a *user-programmable* terminal as one that operates under the direction of a user-created program stored within the terminal. Vendors of microprocessor-based terminals sometimes allow the user to create his own microprogram, which is "burned" into a read-only memory (ROM). Minicomputer-based terminals are generally software-supported and usually provide at least an assembly language for users to create application programs.

*Direct connection to computer* refers to terminals that are capable of direct attachment to a computer via the computer's I/O channel and that can operate as on-line peripheral subsystems. Because most terminals can be equipped with RS-232 interfaces, they can be directly attached to many minicomputers with serial I/O interfaces.

Some terminals are designed as direct replacements for other terminals. In the CRT terminal market, replacement terminals fall into three principal categories: those designed to replace an IBM 2260 and/or 2265, those designed to replace an IBM 3270, and those designed to replace a Teletype teletypewriter, Models 33 and 35. Datapro included these three entries to define the category of *compatibility*.

### Display Organization

Printed information is generally arranged according to an orderly format consisting of a maximum number of printed lines per page and characters per line. The orderly arrangement of printed matter also characterizes the arrangement of data displayed on the face of a CRT screen or other display device. The electronic circuitry ➤

## All About Alphanumeric Display Terminals

**TABLE II.  
DISPLAY TERMINAL FEATURES  
FOR THE REQUIREMENTS  
COMMON TO MOST  
APPLICATIONS**

Requirements	Helpful Features
Minimum input errors	function keys editing format control
Minimum operator training	typewriter keyboard format control
Maintainability	local technical service modularity replaceable components
Low cost	LSI circuits high production
Operator satisfaction	green or white phosphor quiet operation flicker-free display cool operation linear presentation brightness control satisfactory character size
Good appearance	attractive styling pleasing color compact size white phosphor cabinet material character style
Unobtrusiveness	compact size quiet operation cool operation
Minimum space	compact size LSI circuits
Glamour	color display cabinet styling

**TABLE III.  
DISPLAY TERMINAL FEATURES  
FOR PHYSICAL APPLICATION  
REQUIREMENTS**

Requirements	Helpful Features
Large screen	raster TV scan
Withstanding dirty environment	adequate filtering cassettes instead of tape reels
Distant viewing	large characters
Clustered terminals	multistation controller
Single terminal	stand-alone device
Communication line economy	party-line interface high speed full-duplex capability multiplexing built-in data set

## All About Alphanumeric Display Terminals

Requirements	Helpful Features
Text handling	upper/lower-case character set large character matrix editing cursor control slewing cursor
Data entry	format control cursor control column counter editing
Pointing	light pen large character matrix cursor
Minimum typing	function keys cursor control block transmission editing
Input verification	field selection cursor control blanking editing blinking tab stops
Operator alert	blinking color display audible signal
Protecting data fields	format control field protection
Re-entering data	slewing cursor cursor control editing
Drawing bar charts	graphic capability special character generator

TABLE IV.  
DISPLAY TERMINAL FEATURES  
FOR MAN/MACHINE  
APPLICATION REQUIREMENTS

Requirements	Helpful Features
Remote operations	data set interface long-line driver/receiver interface
Fast access	high speed function keys
Hard copy	printer cassettes (for later transcription)
Local storage	page memory cassettes
Simultaneous I/O	full duplex peripheral devices
Logging	printer cassette

TABLE V.  
DISPLAY TERMINAL FEATURES  
FOR SYSTEM APPLICATION  
REQUIREMENTS

Requirements	Helpful Features
Special symbols	character generator options
Television compatibility	raster scan
Teletype compatibility	72-character line 10-character/second speed ASCII coding and discipline
Punched card compatibility	80-character line
Code conformity	ASCII coding
Special inputs	function keys special keyboard capability

TABLE VI.  
DISPLAY TERMINAL FEATURES  
FOR COMPATIBLE  
APPLICATION REQUIREMENTS

## All About Alphanumeric Display Terminals



New from Intel, the user-programmable OP-1 is microprocessor-based and includes up to 16K bytes of memory and a 1920-character screen. The terminal is available with 3M single or dual cartridge tape drives, Diablo 20 or 30 series cartridge disk drives, and an impact printer.

▷ that produces the display image is designed to a specified set of parameters which define the capacity (i.e., the maximum number of *display positions*), and the *display format* (i.e., the maximum number of displayable lines and displayable characters per line). Information is displayed in a rectangular area smaller than the total surface area of the display device. The factors that determine the required size of the *display area* are the display arrangement and the size of the displayable characters, which is normally a fixed parameter.

*Symbol formation* and the set of *displayable symbols* are functions of the character generator, which accepts coded characters (typically ASCII) from the computer and keyboard and converts them to a number of dots or strokes so that the form of the symbol or image can be displayed. In CRT's, characters are formed by a variety of techniques, including dots, strokes, starburst, or monoscope. The dot technique is by far the most popular. Each character is formed within a matrix of dots, and only those dots required to form the specific character are intensified. Typically, a dot matrix contains 35 dots arranged 7 dots high by 5 dots wide. Characters can be made clearer by increasing the number of dots within the matrix. The stroke technique forms characters by drawing short straight lines between specified points.

Solid-state display devices, such as plasma (gas) and LED (Light Emitting Diodes) are gaining popularity, but at present are generally limited to small display capacities consisting of a few characters. These typically form a character image in much the same way as a CRT display (i.e., via a dot matrix), though some present segmented symbols.

### Keyboard

Keyboard *style* defines the general arrangement of keys; e.g., typewriter or data entry style. The *character set*

refers to the set of symbols that appear on the keytops and, in many cases, to the actual character codes generated for each key depression, such as ASCII, EBCDIC, APL, etc. Some terminals are available with more than one keyboard style to satisfy particular user needs.

Some terminals are available with program *function keys*. These are special keys whose character codes are interpreted by the user's program. A function key is used to reduce the number of required input keystrokes and therefore save time and reduce the number of input errors. The key cap explains the function performed by the system when the system receives the unique code that is generated by the depression of each function key. Depressing one key could instruct the system to "sell one seat" or "call Chart A," for example.

A *numeric keypad* is a special keyboard feature that includes a set or block of 10 numeric keys, usually located to the right of the main keygroup. These numeric keys are arranged in an adding-machine format and are particularly useful for applications that require volume numeric entry or arithmetic calculations.

Keyboards that can either fit flush against the display or be located some distance away via cable connection are referred to as *detachable* keyboards. This feature provides increased configuration flexibility and operator convenience.

### Features

Today's display terminals offer a wide variety of potentially useful features and capabilities. No one terminal has them all, however, and some stripped-down economy models offer very few of them.

Many of these equipment features are essentially self-explanatory, and the unique features of specific terminals are thoroughly explained and evaluated in the individual DATAPRO 70 Peripheral reports on those terminals. For these reasons, only the features which are of general interest and which do not readily explain themselves are described in the paragraphs that follow. Comprehensive lists of desirable terminal features for specific application requirements, however, are presented in Tables II through VI.

The *cursor* marks the position on the screen where the next character will be read or written from memory. Cursor control enables the operator to maneuver the cursor on the screen and facilitates the input and output of data. Some terminals also have *program-addressable/readable cursors*, which enable the position of the cursor to be written or read by the computer under program control. Some cursors *blink*; others keep moving as long as the control key remains depressed; and all should be of the nondestructive type. Different manufacturers use a variety of symbols to indicate the cursor position on the screen.



## All About Alphanumeric Display Terminals

Typical cursor controls include:

- Move left (L)—moves the cursor one space to the left (which can be from the initial character position of a line to the last character position of the previous line if the terminal features wraparound).
- Move right (R)—moves the cursor one space to the right (which can be from the last character position of a line to the first character position of the next line if the terminal features wraparound).
- Move up (U)—moves the cursor to the same position on the previous line (which can be from the first line to the last line if the terminal features wraparound).
- Move down (D)—moves the cursor to the same position on the following line (which can be from the last line to the first line if the terminal features wraparound).
- Home top (H)—moves the cursor to the initial character position of the first line.
- Home bottom—moves the cursor to the initial character position of the last line.
- Tab—moves the cursor forward to the next tab stop or backward to the previous tab stop (backtab).
- Return (Rt)—moves the cursor to the initial character position of the next line (identical to the carriage return function of a typewriter).
- Backspace—moves the cursor one space to the left.
- Line Feed—moves the cursor to the same position on the following line.

Editing features in a display terminal may consist of any combination of the functions listed below, although the best terminal for editing purposes would include all of them. Each function is performed with respect to the current position of the cursor. The desirable editing functions are:

- *Character insert*—the capability to insert a character into an existing line of displayed text; the text spreads to accommodate the added character. The “spreading” capability may terminate at the last character position of the line or at the last displayable position on the screen. Data is lost when it is spread beyond the termination point.
- *Character delete*—the capability to delete a character from an existing line of displayed text; the remaining text closes up when the character is deleted.
- *Line insert*—the capability to insert a line of text into existing text; the text spreads to accommodate the added line.

- *Line delete*—the capability to delete a line of text from existing text; the remaining text closes up when the line is deleted.
- *Erase*—the capability to erase a character, line of text, message, field, or the complete screen. Most terminals include *character erase* and some form of *display erase*, which may erase the entire contents of the display, just that portion following the cursor location, or a combination of both functions.

Some display terminals are equipped with a *roll* feature. This feature is analogous to the movement of printed copy exiting from a teletypewriter as it is printed, and is an important feature for applications that require the operator to scan several blocks of text to locate key information. As each line of text is received from the computer or cassette tape, all existing lines of text move up or down by one line, depending on the direction of roll. (Some displays can roll in either direction, while others provide only one direction.) Data is lost as it rolls off the screen unless the display memory exceeds the screen capacity.

Most businesses use printed forms for daily activities such as billing, ordering, payroll, and a host of other applications. Some CRT terminals can duplicate the printed form on the face of the screen, and data can be keyed into the blank spaces just as the typist enters data into a printed form. This “fill-in-the-blanks” approach to data entry requires a *protected format* capability. Display terminals that incorporate this feature treat the fixed format differently from the keyed data. Field identifiers such as “name” or “salesman number” are protected from inadvertent key entry, and allowable entries are confined to the variable fields (blank spaces) following the field identifiers. Some terminals automatically tab to the beginning of the next variable field immediately following the entry of the character that completes each field. The tab key is used where a field is partially filled.

Having completed entry into the fixed format, the operator transmits the data to the central computer. A feature called *partial screen transmit* promotes line economies by transmitting only the keyed data; the fixed format remains displayed and the “blanks” are erased for the next entry.

Some special features that enhance the operation of a display terminal include:

- *Character repeat*—enters a continuous sequence of the symbol generated by a depressed key as long as the key remains depressed.
- *Character or field blinking*—draws the operator’s attention to vital information by blinking only that character or field that presents the important data.
- *Programmable brightness levels*—visually separate different kinds of displayed information by displaying



## All About Alphanumeric Display Terminals

➤ each type at a different intensity level. This feature is analogous to the use of color displays.

- *Reverse video*—displays a “negative” image of data; i.e., data normally displayed in white on a dark background is displayed in black on a white background. This feature can be used for alerting one’s attention to pertinent data, and can often be used with character or field blinking as well as with programmable brightness levels. It may be possible to display one or more characters or fields or the entire screen in reverse video.
- *Audible alarm*—alerts the attention of an operator absent from the terminal to a pending message.

### Auxiliary Devices

External I/O devices can add considerable flexibility to the applications possibilities for display terminals. A *cassette recorder* or *diskette drive* can be used to store display formats, data to be transmitted, or user programs in the case of intelligent terminals. A *printer* provides hard copy when required. A *light pen* permits the user to initiate commands or to “call for” a page of data by pointing the pen at a displayed entry. Although the above I/O devices are the most common, other devices can be and are used, such as industry-compatible 7- or 9-track magnetic tape drives, disk drives (cartridge or pack type), card readers, etc.

### Transmission

The display terminal contains a communications interface that enables communications between the terminal and the central computer site. *Mode* and *technique* define the operating mode and the method in which data is transmitted. There are three operating modes: simplex (transmission in one direction only), half duplex (transmission both directions, but not simultaneously), and full duplex (simultaneous transmission in both directions).

Data is transmitted synchronously or asynchronously. Asynchronous transmission is characterized by the transmission of data in irregular spurts, where the duration of time can vary between successive transmitted characters; the transmission from an unbuffered teletypewriter is a good example. Synchronous transmission implies the transmission of data in a steady stream. Each transmitted character is clocked, and the time interval between successive characters is always precisely the same. The communications interface either provides clocking or accepts external clocking signals from the data set.

The transmission *code* refers to the bit pattern of the transmitted characters. Two codes are prominent, EBCDIC and ASCII; the latter has been accepted as an industry and government standard, and is now by far the most commonly used code.

The *communications discipline* refers to the type of line protocol or control code sequences with which the terminal is compatible, such as ASCII, Binary Synchronous Communications (BSC), or Synchronous Data Link Control (SDLC).

The CRT terminal is a high-speed device that is typically capable of transmitting and receiving several thousand characters per second; however, it must run at a *speed* that is compatible with the communications system in which it is used. Most terminals are used on voice-grade facilities, which limit the transmission speed to a practical maximum of 4800 bits per second over the dial network and 9600 bits per second over leased or private lines.

*Message format* refers to the way data is transmitted, e.g., by block or by character. Terminals that are designed to be transmission-compatible with a Teletype unit transmit a character for each key depression. Buffered terminals transmit data in multi-character blocks. The block mode permits data to be composed and edited prior to each transmission and generally permits more efficient utilization of the communications facility. Some terminals offer manual selection between the two modes.

*Polling/addressing* characterizes terminals that are capable of operating in a multiple-terminals-per-line environment such as that employed by the IBM 3270 and 2260/2265 display terminals. Basic to implementing this capability is the ability of a terminal to distinguish a control message intended for it alone. Polling invites the terminals to send data. Addressing informs the terminal that a message from the central computer is coming, so that it will be conditioned to receive. Central control of the message traffic is maintained by the central computer.

*Automatic answer* refers to the facility for unattended operation on the dial network whereby incoming calls are automatically answered and messages are received without human intervention.

The terminal’s interface generally meets the standard *EIA RS-232B/C* specification and connects to a modem or acoustic telephone coupler.

Some terminals contain an *integral modem* that can be connected directly to a communications line via a Bell System Data Access Arrangement. In some cases the manufacturer also provides an *acoustic and/or inductive telephone coupler* so that the terminal can be connected to a conventional telephone handset.

### Pricing and Availability

The comparison charts show the monthly rental prices under 1-year and 2-year leases and the purchase prices for each display unit and for its controller where applicable. Many terminal suppliers do not lease their equipment, and in these cases you’ll find dashes in the lease price entries. Also, a number of terminal makers sell their wares on an

## All About Alphanumeric Display Terminals



*The Datamedia Elite 1520A features Teletype compatibility, a 1920-character screen, a full upper and lower case character set, and a detachable typewriter-style keyboard with numeric pad—all for just \$65 per month (\$1,555 purchase).*

*Director of Marketing - Terminals*

➤ OEM basis only, for incorporation into systems supplied by other vendors. Single entries generally indicate the price of a basic unit without options; price ranges show the price of the basic unit and the price of an expanded unit with all options.

*Date of first delivery* indicates when the first production model of each terminal was delivered (or is scheduled to be delivered) to a customer.

*Number installed to date* shows how many terminals of each type had been delivered to customers as of approximately March 1, 1975. All figures were supplied by the manufacturers themselves, and a number of companies chose not to release this information.

*Serviced by* specifies the party responsible for maintaining the terminal. In some cases the manufacturer provides total service; in others a national service organization is responsible. Service is sometimes rendered under the combined efforts of both the supplier and an independent service organization.

*Comments* at the bottom of the charts describe significant or unusual features, capabilities, or applications which are not reflected in the standard entries.

### Manufacturers

Listed below, for your convenience in obtaining additional information, are the full names and addresses of the 70 vendors whose products are summarized in the comparison charts.

*Ann Arbor Terminals, Inc.*, 6107 Jackson Road, Ann Arbor, Michigan 48103. Telephone (313) 769-0926.

*Applied Digital Data Systems, Inc.*, 100 Marcus Boulevard, Hauppauge, New York 11787. Telephone (516) 231-5400.

*Beehive Terminals*, 870 West 2600 South, PO Box 19244, Salt Lake City, Utah 84119. Telephone (801) 487-0741.

*Bunker Ramo Corporation*, Trumbull Industrial Park, Trumbull, Connecticut 06609. Telephone (203) 377-4141.

*Burroughs Corporation*, Business Machines Group, Room 2A38, Burroughs Place, Detroit, Michigan 48232. Telephone (313) 972-9115.

*California Computer Products, Inc. (CalComp)*, 2411 W. LaPalma Avenue, Anaheim, California 92801. Telephone (714) 821-2011.

*CompuTek, Inc.*, 143 Albany Street, Cambridge, Massachusetts 02139. Telephone (617) 864-5140.

*Computer Communications, Inc.*, 2610 Columbia Street, Torrance, California 90503. Telephone (213) 320-9101.

*Computer Optics, Inc.*, Berkshire Industrial Park, Bethel, Connecticut 06801. Telephone (203) 744-6720.

*Conrac Corporation*, Conrac Division, 600 N. Rimsdale Avenue, Covina, California. Telephone (213) 966-3511.

*Control Data Corporation*, 8100 34th Avenue South, Minneapolis, Minnesota 55420. Telephone (612) 853-4656.

*Courier Terminal Systems, Inc.*, 2202 E. University Drive, Phoenix, Arizona 85034. Telephone (602) 244-1392.

*Data General Corporation*, Route 9, Southboro, Massachusetts, 01770. Telephone (617) 485-9100.

*Datamedia Corporation*, 7300 N. Crescent Boulevard, Pennsauken, New Jersey 08110. Telephone (609) 665-2382.

*Data 100 Corporation*, 7725 Washington Avenue South, Minneapolis, Minnesota 55435. Telephone (612) 941-6500.

*Datapoint Corporation*, 9725 Datapoint Drive, San Antonio, Texas 78284. Telephone (512) 696-4520.

## All About Alphanumeric Display Terminals

▷ *Delta Data Systems Corporation*, Woodhaven Industrial Park, Cornwells Heights, Pennsylvania 19020. Telephone (215) 639-9400.

*Digital Equipment Corporation*, 146 Main Street, Maynard, Massachusetts 01754. Telephone (617) 897-5111.

*Digi-Log Systems, Inc.*, Babylon Road, Horsham, Pennsylvania 19044. Telephone (215) 672-0800.

*Four-Phase Systems, Inc.*, 19333 Vallco Parkway, Cupertino, California 95014. Telephone (408) 255-0900.

*Genesis One Computer Corporation*, 300 East 44th Street, New York, New York 10017. Telephone (212) 557-3500.

*GTE Information Systems, Inc.*, One Stamford Forum, Stamford, Connecticut 06904. Telephone (203) 357-2000.

*Hazeltine Corporation*, Greenlawn, New York 11740. Telephone (516) 261-7000.

*Hendrix Electronics, Inc.*, 645 Harvey Road, Manchester, New Hampshire 03103. Telephone (603) 669-9050.

*Hewlett-Packard*, 1501 Page Mill Road, Palo Alto, California 94304. Telephone (415) 493-1501.

*Honeywell Information Systems, Inc.*, 60 Walnut Street, Wellesley Hills, Massachusetts 02181. Telephone (617) 237-4100.

*International Business Machines Corporation (IBM)*, Data Processing Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

*Incoterm Corporation*, 6 Strathmore Road, Natick, Massachusetts 01760. Telephone (617) 655-6100.

*Infoton, Inc.*, Second Avenue, Burlington, Massachusetts 01803. Telephone (617) 272-6660.



This modern display terminal produced by Applied Digital Systems (ADDs) is available as a Teletype replacement (Model Data 980) or an IBM 3275 replacement (Model 980A). Features include a 1920-character screen, full edit and data entry capabilities, and numeric keypad.

*Interface Technology, Inc.*, St. Louis, Missouri 63132. Telephone (314) 426-6880.

*International Communications Corporation (ICC)*, 8600 N.W. 41st Street, Miami, Florida 33166. Telephone (305) 592-7654.

*International Telephone & Telegraph Corporation (ITT)*, Data Equipment & Systems Division, East Union Avenue, East Rutherford, New Jersey 07073. Telephone (201) 935-3900.

*Jacquard Systems*, 1505 11th Street, Santa Monica, California 90404. Telephone (213) 393-3711.

*Kustom Electronics Inc.*, Data Communications Division, 1010 West Chestnut, Chanute, Kansas 66720. Telephone (316) 431-4380.

*Lear Siegler, Inc.*, Electronic Instrumentation Division, 714 North Brookhurst Street, Anaheim, California 92803. Telephone (714) 774-1010.

*Megadata Computer and Communications Corporation*, 10 Evergreen Place, Deer Park, New York 11729. Telephone (516) 589-6800.

*Microtech Data Systems, Inc.*, 1141 East Janis Street, Carson, California 90746. Telephone (213) 637-1981.

*NCR Corporation*, EDP Products, Building 23, 3rd Floor, Main & K Streets, Dayton, Ohio 45409. Telephone (513) 449-6620.

*Olivetti Corporation of America*, 500 Park Avenue, New York, New York 10022. Telephone (212) 371-5500.

*Omron Systems, Inc.*, 432 Toyama Drive, Sunnyvale, California 94086. Telephone (408) 734-8400.

*Ontel Corporation*, 3 Fairchild Court, Plainview, New York 11803. Telephone (516) 822-7800.

*Pertec Business Systems*, 17112 Armstrong Avenue, Santa Ana, California 92705. Telephone (714) 540-8340.

*Plantronics, Inc.*, 385 Reed Street, Santa Clara, California 95050. Telephone (408) 249-1160.

*Quotron Systems, Inc.*, 5454 Beethoven Street, Los Angeles, California 90066. Telephone (213) 398-2761.

*Randal Data Systems*, 2807 Oregon Court, Torrance, California 90503. Telephone (213) 320-8550.

*Raytheon Data Systems Company*, Division of Raytheon Company, 1415 Boston-Providence Turnpike, Norwood, Massachusetts 02162. Telephone (617) 762-6700.

*Research, Inc.*, PO Box 24064, Minneapolis, Minnesota 55424. Telephone (612) 941-3300.

*Sanders Data Systems, Inc.*, Daniel Webster Highway, Nashua, New Hampshire 03060. Telephone (603) 885-6685.

*Scientific Measurement Systems, Inc.*, 26 Olney Avenue, Cherry Hill, New Jersey 08003. Telephone (609) 424-5220.

*Selecterm, Inc.*, 59 Union Square, Summerville, Massachusetts 02143. Telephone (617) 623-7800.

*I.P. Sharp Associates, Ltd.*, PO Box 1900, Karleton Place, Ontario. Telephone (613) 257-3610.

*The Singer Company*, 2350 Washington Avenue, San Leandro, California 94577. Telephone (415) 357-6800.

## All About Alphanumeric Display Terminals

*Sycor, Inc.*, 100 Phoenix Drive, Ann Arbor, Michigan 48104.  
Telephone (313) 971-0900.

*SYS Computer Corporation*, 17-25 DiCarolus Court, Hackensack,  
New Jersey 07601. Telephone (201) 488-0300.

*TEC, Inc.*, 9800 North Oracle Road, Tuscon, Arizona 85704.  
Telephone (602) 297-1111.

*Tektronix, Inc.*, PO Box 500, Beaverton, Oregon 97005.  
Telephone (503) 644-0161.

*Teleram Communications Corporation*, 1032 Mamaroneck  
Avenue, Mamaroneck, New York 10543. Telephone (914)  
698-7789.

*Teletype Corporation*, 5555 Touhy Avenue, Skokie, Illinois  
60076. Telephone (312) 982-2000.

*Termiflex Corporation*, 17 Airport Road, PO Box 1123, Nashua,  
New Hampshire 03060. Telephone (603) 889-3883.

*Terminal Communications, Inc.*, 3301 Terminal Drive, Raleigh,  
North Carolina 27611. Telephone (919) 834-5251.

*Texas Scientific Corporation*, 8000 Harwin Drive, Houston, Texas  
77036. Telephone (713) 785-7731.

*Trivex, Inc.*, Information Systems Division, 3180 Red Hill Avenue,  
Costa Mesa, California 92626. Telephone (714) 546-7781.

*UNIVAC Division*, Sperry Rand Corporation, PO Box 500, Blue  
Bell, Pennsylvania 19422. Telephone (215) 542-4011.

*Video Data Systems*, 657 Old Willets Path, Hauppauge, New York  
11787. Telephone (516) 234-1010.

*Wang Laboratories, Inc.*, 836 North Street, Tewksbury,  
Massachusetts 01876. Telephone (617) 851-4111.

*Westinghouse Canada, Ltd.*, Box 510, Hamilton, Ontario, Canada  
L8N 3K2. Telephone (416) 528-8811.

*Wiltek, Inc.*, Glover Avenue, Norwalk, Connecticut 06850.  
Telephone (203) 853-7400.



*Here's a good example of reverse video (dark characters on a light background). Produced by Ann Arbor Terminals, the Design III features Teletype compatibility, a variety of screen sizes up to 3200 characters, a detachable Teletype-style keyboard including numeric keypad, and a host of options.*

*Wyle Computer Products*, a Division of Wyle Laboratories, 3200  
Magruder Boulevard, Hampton, Virginia 23666. Telephone (213)  
322-1763.

*Xerox Corporation*, 70 South Aviation Boulevard, El Segundo,  
California 90245. Telephone (213) 679-4511.

*Zentec Corporation*, 2368-C Walsh Avenue, Santa Clara, California  
95050. Telephone (408) 246-7662. □



## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Ann Arbor Terminals DESIGN III KSR/RO	Ann Arbor Terminals Series 200 KSR/RO	Applied Digital Data Systems (ADDS) Consul 580 & MRD 380	Applied Digital Data Systems (ADDS) Consul 880A & MRD 780A	Applied Digital Data Systems (ADDS) Consul 920 & MRD 780
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 1 No No — Std. No No	Stand-alone 1 No No — Std. No No	Stand-alone 1 No No — Std. No No	Stand-alone 1; up to 96 chained No No No No No No	Stand-alone 1 No No No MRD 780 only No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	256 to 3200 8 x 32 to 40 x 80 14-inch diag. tube 64, 96, or 128 5 x 7 or 7 x 9 dot matrix	256 to 3200 8 x 32 to 40 x 80 9- to 23-inch tube 64, 96, or 128 5 x 7 or 7 x 9 dot matrix	1920 24 x 80 8 x 10 64 5 x 7 dot matrix	1920 24 x 80 8 x 10 64 5 x 7 dot matrix	1920 24 x 80 8 x 10 96 (920); 64 (780) 5 x 7 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Teletype (KSR)  ASCII None Std. Std.	Teletype (KSR)  ASCII None Opt. Std.	Typewriter  ASCII None Std. No	Typewriter  ASCII None Std. No	Typewriter  ASCII 11 opt. (920) Std. Opt. (780)
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  Opt. Opt. Opt. Char. & screen; line opt. Std. Opt. Opt. Opt. Std., address. only Std. Opt. 2 opt. Opt. Opt. Special char. sets, limited graphics	U, D, L, R, H, Rt.  Opt. Opt. Opt. Char. & screen; line opt. Std. Opt. Opt. Opt. Std., address. only Std. Opt. 2 opt. Opt. Opt. Special char. sets	L, R, U, D, H  Opt. No No Char. & screen std.  Std. No No No Std., address. only Std. No No Std. —	L, R, U, D, H  No Std. No Char., line, screen  Std., up only Std. Std. Std. Std., address. only Std. Std. 2 std. No No Vector generation; 72 x 160 dots	L, R, U, D, H  No Std. (780 only) No Char., line, screen  Std. Std. Std. Std. Std. Std., selectable Std. (920 only) Vector generation (780 only); 72 x 160 dots
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None Opt. interface None None	None None Opt. interface None None	RS-232 interface RS-232 interface Non-input (NCR) None None	RS-232 interface RS-232 interface Non-impact (NCR) None None	Interface (920) Interface (920) Non-impact (920) None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answerer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Asynchronous ASCII ASCII Up to 9600  Char./block opt. Opt. No Std. No No	Half/full duplex Asynchronous ASCII ASCII Up to 9600  Char./block opt. Opt. No Std. No No	Half/full duplex Asynchronous ASCII ASCII Up to 9600  Char. only No No Std.; 20 ma. opt. No No	Half/full duplex Asynchronous ASCII ASCII Up to 9600  Block Std. No Std. No Std.	Half/full duplex Asynchronous ASCII ASCII Up to 9600  Char./block No No Std. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date  Serviced by	— — 1,145 to 2,545 — — — 12/73 500 KSR; 100 RO Ann Arbor	— — 725 to 1,075 — — — 5/70 2,000 KSR; 3,000 RO Ann Arbor	— — 1,795 (Consul 580) — — — 73(580); 74(380) 3,000 (580); 200 (380) NCR	— — 3,265-3,845(880A) — — — 9/73 600 (880A); 200 (780A) NCR	— — 2,600 (920) — — — 4/70 5,000 (920); 750 (780) NCR
<b>COMMENTS</b>	Terminals are available in a total of 5 display formats: 16 x 32, 24 x 40, 16 x 80, 24 x 80, and 40 x 80. DESIGN III uses same circuitry as Series 200, but is housed in attractive casework. Series 200 is available as circuit boards with monitor in desk or rack mounting		Also available from NCR as Model 796-101; MRD 380 is rack-mount controller priced at \$1,195	Also available from NCR as Model 796-301; MRD 780A is rack-mount controller priced at \$2,825 to \$3,170	MRD 780 is rack-mounted controller, separate keyboard and monitors; price is \$2,265

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Applied Digital Data Systems (ADDS) Consul 980 & MRD 980	Applied Digital Data Systems (ADDS) Consul 980A	Applied Digital Data Systems (ADDS) Envoy 680	Beehive Terminals Mini Bee 2	Beehive Terminals Mini Bee 4
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 1 No No Minicomputer only Std. No No	Stand-alone 1 No No No No No Std.; IBM 3275	Stand-alone 1 Std.; 26 lbs. No No No Std. No No	Stand-alone 1 No No No Std. No No	Stand-alone 1 No No No Std. No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	1920 24 x 80 8 x 10 96 5 x 7 dot matrix	1920 24 x 80 8 x 10 96 5 x 7 dot matrix	1920 24 x 80 4 x 5 64 5 x 7 dot matrix	2000 25 x 80 6.5 x 8.4 64 5 x 7 dot matrix	2000 25 x 80 6.5 x 8.4 128 5 x 7 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter  ASCII 11 opt. Std. No	Typewriter  ASCII 11 opt. Std. No	Typewriter  ASCII None No No	Typewriter  ASCII None Opt. Std.	Typewriter  ASCII None Std. Std.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	L, R, U, D, H  No Std. Std. Std.  Std., up only Std. Std. Std. Std., address. only Std. Std. 2 std. Std. Std. Vector generation; 72 x 160 dots	L, R, U, D, H  No Std. Std. Std.  Std., up only Std. Std. Std. Std. Std. 2 std. Std. Std. —	L, R, U, D, H  No Std. No Std.  Std., up only Std. Std. Std. Std., address. only Std. Std. 2 std. No No Vector generation; 72 x 160 dots	L, R, U, D, Rt.  Std. No No Char., line, screen  Std., up only No No No Std. No No Std. —	L, R, U, D, H, Rt.  Std. No No Char., line, field, screen  Std., up only Std. Std. Std., address. only Std. No No Std. —
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	RS-232 interface RS-232 interface Non-impact (NCR) None None	RS-232 interface RS-232 interface Impact (Centronics) None None	RS-232 interface RS-232 interface RS-232 interface None None	None None None None None	RS-232 interface RS-232 interface RS-232 interface None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Asynchronous ASCII ASCII Up to 9600  Char./block No No Std. No No	Half duplex Synchronous ASCII BSC Up to 9600  Block Std. No Std. No No	Half duplex Asynchronous ASCII ASCII Up to 300  Char./block No No No No Std.	Half/full duplex Asynchronous ASCII ASCII Up to 9600  Char. only No No Std. No No	Half/full duplex Asynchronous ASCII ASCII Up to 9600  Char./block No No Std. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	— — 2,800 (Consul 980) — — — 11/74; 4/75 (MRD) 600 (Consul 980)	— 155; 125 (3-yr.) 3,200 — — — 6/75 —	— 99-106 (3-yr.) 3,895 to 4,090 — — — 4/70 300	— — 1,795 — — — 8/73 —	— — 2,395 — — — 4/74 —
Serviced by	NCR	NCR	NCR	Factory & Sorbus	Factory & Sorbus
<b>COMMENTS</b>	MRD 980 is rack-mount controller priced at \$1,995				



## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Beehive Terminals Super Bee 2	Beehive Terminals Super Bee 3	Beehive Terminals Speedi Bee 8	Beehive Terminals Texterm	Bunker Ramo Model 2204/15
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 1 No Yes, via ROM No Std. No No	Stand-alone 1 No Yes, via ROM No No No No	Stand-alone 1 No No No No No No	Stand-alone 1 No Yes, via ROM No No No No	Cluster 36 No No Std. No Std. No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	2000 25 x 80 6.5 x 8.4 128 5 x 7 dot matrix	2000 25 x 80 6.5 x 8.4 128 5 x 7 dot matrix	2000 25 x 80 6.5 x 8.4 128 5 x 7 dot matrix	2000 25 x 80 7.5 x 9.5 256 7 x 9 dot matrix	1920 24 x 80 5.4 x 7.2 96 5 x 7 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter  ASCII 8 std. Std. Std.	Typewriter  ASCII 8 std. Std. Std.	Typewriter  ASCII None Opt. Std.	Typewriter  ASCII 8 std. Std. Std.	Typewriter  ASCII 16 std. Std. Std.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, field, screen Std., up or down Std. Std. Std. Std. Std. Std. No Std. Std. Paging, forward or backward, std.	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, field, screen Std., up or down Std. Std. Std. Std. Std. Std. No Std. Std. Paging, forward or backward, std.	U, D, L, R, H, Rt.  Std. No No Char., line, field, screen No Std. Std. Std. Std., address. only Std. Std. Std. 2 std. Std. Std. —	U, D, L, R, Rt.  Std. Std. Std. Char., line, field, screen Std., up or down Std. Std. Std. Std. Std. Std. 2 std. Std. Std. Paging, forward or backward, std.	L, R, H, Rt.  No Std. No Char., line No No Std. Std. Std., address. only No Std. No No Opt. None
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None RS-232 interface None None	Single cassette None RS-232 interface None None	None None None None None	None None RS-232 interface None None	None None Impact None Paper tape reader/punch
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Async./sync. ASCII User-specified Up to 9600  Char./block Opt. No Std. No No	Half/full duplex Async./sync. ASCII User-specified Up to 9600  Char./block Std. No Std. No No	Half/full duplex Asynchronous ASCII — 500K char./sec.  Char./block No No No; TTL 8-bit par'l. No No	Half/full duplex Async./sync. ASCII User-specified Up to 9600  Block Std. No Std. No No	Half/full duplex Async./sync. ASCII ASCII 1200 to 4800  Block Std. No Std. Opt. Opt.
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	— — 3,295 — — — 5/73 —	— — 3,695 — — — 6/74 —	— — 3,695 — — — — —	— — 3,995 — — — — —	— 44 1,550 — 93 to 380 3,500 to 15,000 3/73 —
Serviced by	Factory & Sorbus	Factory & Sorbus	Factory & Sorbus	Factory & Sorbus	Bunker Ramo
<b>COMMENTS</b>					All display models can be intermixed on same controller

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Bunker Ramo Model 2206/17	Bunker Ramo Model 2210	Bunker Ramo Model 2212	Burroughs TD 700	Burroughs TD 800
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Cluster 36 No No Yes No Std. No	Cluster 36 No No Yes No Std. No	Cluster 36 No No Yes No Std. No	Stand-alone 1 No No Std., Burr. only No Opt. Opt.	Stand-alone 1 No No Std., Burr. only No Opt. Opt.
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	1920 24 x 80 6.25 x 8.75 96 5 x 7 dot matrix	200 10 x 20 2 x 2.25 96 5 x 7 dot matrix	480 12 x 40 3 x 4 96 5 x 7 dot matrix	256 8 x 32 3.25 x 8.75 64 5 x 7 dot matrix	960/1920 12/24 x 80 7.5 x 9.5 64 5 x 7 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter  ASCII 16 std. Std. Std.	Block  ASCII 6 std. Std. No	Block  ASCII 12 std. Std. No	Typewriter/data entry ASCII None No Std.	Typewriter/data entry/numeric ASCII None No Std.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	L, R, H, Rt.  No Std. No Line, screen  No No Std. Std. Std., address. only No Std. No No Opt. None	L, R, H, Rt.  No Std. No Screen  No No Std. Std. Std., address. only No Std. No No No None	L, R, H, Rt.  No Std. No Line, screen  No No Std. Std. Std., address. only No Std. No No No None	U, D, L, R, H, Rt.  Not specified Opt. No Char., screen  No Std. Opt. Opt. No No No No Std.	U, D, L, R, H, Rt.  Std. Std. No Char., screen  No Std. Std. Std. No Std. No No No Std.
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None Impact None Paper tape reader/ punch	None None Impact None Paper tape reader/ punch	None None Impact None Paper tape reader/ punch	None None Impact None None	None None Impact None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Async./sync. ASCII ASCII 1200 to 4800  Block Std. No Std. Opt. Opt.	Half/full duplex Async./sync. ASCII ASCII 1200 to 4800  Block Std. No Std. Opt. Opt.	Half/full duplex Async./sync. ASCII ASCII 1200 to 4800  Block Std. No Std. Opt. Opt.	Half duplex Async./sync. ASCII ASCII/BSC Up to 9600  Char./block Std. No Opt. No No	Half duplex Async./sync. ASCII ASCII/BSC Up to 9600  Char./block Std. No Opt. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	— 40 1,490 — 93 to 380 3,500 to 15,000 1/70 Over 30,000	— 19 760 — 93 to 380 3,500 to 15,000 1/70 —	— 37 1,345 — 93 to 380 3,500 to 15,000 1/70 —	115 113 (3-yr.) 4,150 — — — 6/73 —	130 to 145 127 to 142 (3-yr.) 5,000 to 5,500 — — — 9/73 —
Serviced by	Bunker Ramo	Bunker Ramo	Bunker Ramo	Burroughs	Burroughs
<b>COMMENTS</b>		Small desk-top unit containing block keyboard and 3- inch screen	Small desk-top unit containing 3 block keygroups and 6-inch screen	Uses Burroughs Self-Scan gas tech- nology display panel; display, con- trol, and keyboard are separate; sev- eral terminals can share one modem	

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Burroughs TD 820	CalComp Virtual Terminal System	Computek Model 200	Computer Communications Model CC-40	Computer Optics CO:77
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 1 No No Std., Burr. only No Opt. Opt.	Cluster 60 No Opt. Std., IBM 360/370 No No Opt.	Either 4 Opt. Via PROM Std. Via microprogram Via microprogram Via microprogram	Either 15 No No No No Opt. No	Either 32 No No No No No Std.
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	960/1920 12/24 x 80 14.8 x 16.4 96 5 x 7 dot matrix	240/480/960/1920 6/12 x 40/80 12 (diagonal) 128; to 512 opt. 7 x 9 dot matrix	480/960/2000 25 x 80 6 x 8 128 14 x 20 dot matrix	960/1920 24 x 40/80 Variable 64; 96 opt. 5 x 7 dot matrix	480/960/1920 12 x 40/80; 24 x 80 16-inch diag. 64; 96 opt. 7 x 9 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter/data entry ASCII All keys Opt. Std.	Typewriter/data entry/console EBCDIC 10 std.; 15 opt. Opt. Std.	Data entry  ASCII 22 std. Std. Std.	Typewriter  ASCII 16 std. None Std.	Several  ASCII/EBCDIC Std. Opt. Std.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  No Std. Std. Char., line, screen  Std., up & down Std. Std. Std. Std. Std. Std. Std. No Std. Std. Blanking, field overflow & inhibit, lower-case lockout, search	U, D, L, R, H, Rt.  Std. Std. Opt. Char., field, screen  Opt. Std. Std. Std. Std. Std. Std., field only 2 std. Std. Opt. —	U, D, L, R, H, Rt.  Opt. Std. Std. Char., line, screen  Std. Std. Std. Std. Std. Std. Std. 2 std. Opt. —	U, D, L, R, H, Rt.  Std. No No Char., line, screen  No Std. Std. Std. Std. Std. Std. No No Opt. Paging	U, D, L, R, Rt.  No Std. Opt. Char., field, line, screen  No Std. Std. Std. Std. Std. No 2 std. No Opt. —
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	Single/dual drive Single spindle Impact No ID card reader	Opt. Opt. Impact Opt. Card reader, disk drive	Single/dual drive Single/dual spindle Impact/non-impact Opt. Card reader	None None Impact/non-impact Opt. None	None None Impact Opt. ID card reader
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half duplex Async./sync. ASCII ASCII/BSC Up to 9600  Char./block Std. No Opt. No No	Half/full duplex Synchronous ASCII/EBCDIC BSC/SDLC 2400 to 34,800  Char./block Std. Opt. Std. No No	Half/full duplex  Any Any 110 to 19,200  Char./block Opt. No Std. Opt. Opt.	Half/full duplex Async./sync. ASCII ASCII 150 to 9600  Block Std. Std. Std. No No	Half/full duplex Synchronous ASCII/EBCDIC BSC/SDLC 1200 to 9600  Block Std. Opt. Std. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date  Served by	160 to 175 150 to 165 (3-yr.) 6,200 to 6,800 — — — 2nd qtr. 1975 — Burroughs	100 91 4,000 315 287 12,000 12/73 — CalComp	Contact vendor — 3,000 to 8,500 — — — 1972 Over 1,200 Computek	— 115 to 194 (3-yr.) — — — 3,850 to 5,600 3/74 150 CCI	61 to 68 56 to 62 1,504 to 1,682 290 to 295 260 to 270 7,424 1st qtr. 1974 Over 400 CO & Syntonic
<b>COMMENTS</b>			Minicomputer-based unit with up to 16K bytes of RAM & PROM memory; extensive software support	Controller price includes one display unit	Also see Report 70D-192-01 for details

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Conrac 401 Series	Conrac 480 Series TTY Plus	Control Data Model 711	Control Data Model 713	Control Data Model 714
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype-33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Either 16 No Via ROM; Plus only No Opt. No Opt.	Either 8/16/32 No No No Std. No No	Stand-alone 1 No No No No No No	Stand-alone 1 No No No Yes No No	Cluster 15 No No No No No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	2000 25 x 80 7.5 x 10 128 5 x 7 dot matrix	960/2000 12/25 x 80 7.5 x 10 64; 128 5 x 7 dot matrix	640/1280 opt. 8/16 x 80 8 x 10 64; 96 opt. 5 x 9 dot matrix	640/1280 opt. 8/16 x 80 8 x 10 64; 96 opt. 5 x 9 dot matrix	640/1280 8/16 x 80 8 x 10 64; 96 opt. 5 x 9 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Several  ASCII 20 std., + 10 opt. Opt., Plus only Opt., -3 only	Teletype; others opt. ASCII 10 opt. Opt. No	Typewriter  ASCII None Std. No	Typewriter  Teletype None Std. No	Typewriter  ASCII None Std. No
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std. Std.; plus only Std. Std. Std. Std. Std. 2 std. No Yes —	U, D, L, R, H, Rt.  Std.—12, 25 Std.—25; opt.—8,12 Std.—25; opt.—8 Char., line, screen  Std.—25; opt.—8,12 Std.—25; opt.—8,12 Std.—8,25; opt.—12 Std.—25 Addr. std.; read—25 Opt. Std.—8,25 2 std.—25 Std. —	U, D, L, R, H  Std. Opt. Opt. Char. & screen; line opt. Std., up only Opt. Std. No Std. 2 std. No Std. None	U, D, L, R, H, Rt.  Std. No No Char. & screen Std. Std. No No Std. No No Std. None	U, D, L, R, H, Rt.  Std. Opt. Opt. Char. & screen; line opt. Std. — Opt. No No Std. No 2 std. Opt. Std. None
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None 2 ports opt. 2 ports opt. None Contact vendor	RS-232 interface, 25 RS-232 interface, 25 Impact None Contact vendor	None None Impact/non-impact None None	None None Non-impact None None	None None Impact/non-impact None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Async./sync. ASCII ASCII; others opt. 110 to 9600; 50K opt. Char./block Std., Plus only No Std. No No	Half/full duplex Asynchronous ASCII ASCII 110 to 9600; 50K opt. Char./block Opt., 25 only Std. Std. No No	Half duplex Synchronous ASCII ASCII/CDC BSC 2000 to 4800  Block Std. Std. Std. No No	Half/full duplex Asynchronous ASCII ASCII 75 to 300  Char. only Std. Std. No Std. No No	Half/full duplex Async./sync. ASCII ASCII/CDC BSC 2000 to 4800  Char./block Std. Std. Std. No No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	— — 1,800 to 3,600 — — 3,000 to 6,000 9/70; 5/75 (Plus) Over 5,000	— — 1,000 to 2,600 — — 3,000 to 5,000 73/4-8,12; 5/75—25 NA	90 to 111 — 3,500 to 4,120 — — — 6/71 1,000	60 to 70 — 1,995 to 2,315 — — — 4/71 1,800	75 to 89 — 3,300 to 3,900 140 to 160 — 5,300 to 6,300 7/73 165
Serviced by	Conract & Sorbus	Conrac & Sorbus	CDC	CDC	CDC
<b>COMMENTS</b>	Model 401-B is equipped with Bur- roughs interface; Model 401 Plus is microprocessor- based and is avail- able with program- ming support	480 Series cur- rently includes 3 models: 8, 12, and 25. Vendor sells OEM only			

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Courier Executerm 60 & 260	Courier Executerm 65 & 265	Courier 2700	Courier 2750	Data General Model 6012
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Cluster 16 No No Std., IBM 360/370 No Std. No	Stand-alone 1 No No No No Std. No	Cluster 32 No No Std., IBM 360/370 No Opt. Std.	Stand-alone 1 No No No No No Std.	Stand-alone 1 No No Yes Std. No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	480/960/1920 12 x 40/80; 24 x 80 7 x 10 64 7 x 8 dot matrix	480/960/1920 12 x 40/80; 24 x 80 7 x 10 64 7 x 8 dot matrix	480/960/1920 12 x 40/80; 24 x 80 7 x 10 64; 96 opt. 7 x 10 dot matrix	480/960/1920 12 x 40/80; 24 x 80 7 x 10 64; 96 opt. 7 x 10 dot matrix	1920 24 x 80 7 x 9 64 5 x 7 dot matrix
<b>KEYBOARD</b> Style Character set Program function keys Numeric keypad Detachable keyboard	Typewriter/data entry ASCII/EBCDIC 8 opt. Opt. No	Typewriter/data entry ASCII 8 opt. Opt. No	Typewriter/data entry ASCII/EBCDIC 6/12 std. Opt. Std.	Typewriter/data entry ASCII/EBCDIC 6/12 std. Opt. Std.	Typewriter/data entry ASCII No Std. No
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt. Std. Std. No Char., line, screen Std., up only Std. Std. Std. Line address std. Std. Std., field only No No Opt. —	U, D, L, R, H, Rt. Std. Std. No Char., line, screen Std., up only Std. Std. Std. Line address std. Std. Std., field only No No Opt. —	U, D, L, R, H, Rt. Std. Std. No Char., line, screen No Std. Std. Std. Std. Std. Std., field only Std., field only 2 std. No Opt. —	U, D, L, R, H, Rt. Std. Std. No Std. No Std. Std. Std. Std. Std. Std., field only Std., field only 2 std. No Opt. —	U, D, L, R, H, Rt. Std. No No Char., line, screen Std. Std. Std. Std. No Std. Std. No No Opt. —
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None Impact None None	None None Impact None None	None None Impact Opt. ID card reader, 80-col. card reader	None None Impact Opt. ID card reader	None None None None None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half duplex Asynchronous ASCII 1200 to 4800 Block Std. No Std. No No	Half duplex Asynchronous ASCII 1200 to 4800 Block Std. No Std. No No	Half duplex Synchronous ASCII/EBCDIC BSC 1200 to 9600 Block Std. No Std. No No	Half duplex Synchronous ASCII/EBCDIC BSC 1200 to 9600 Block Std. No Std. No No	Half/full duplex Asynchronous ASCII 110 to 4800 Char./block No No Std. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date Served by	— 95 to 150 3,000 to 4,500 — 120 to 350 4,000 to 10,000 7/70; 5/71 (260) 5,000 (incl. 65/265) Courier	— 121 to 160 3,500 to 5,000 — — 7/70; 4/71 (265) 5,000 (incl. 60/260) Courier	— 103 to 173 3,300 to 5,700 — 200 to 450 5,000 to 11,000 1/74 2,400 (incl. 2750) Courier	— 138 to 219 4,500 to 7,200 — — 1/74 2,400 (incl. 2700) Courier	— — 2,700 — — 350 9/74 — Data General
<b>COMMENTS</b>			Uses standard IBM 3270 cables. Also see Report 70D-269-03	Also see Report 70D-269-03	



## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Datamedia Elite 1500A	Datamedia Elite 1520A	Datamedia Elite 2000A	Datamedia Elite 2100A	Datamedia Elite 2500A
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 1 Model 1500P No No No Std. No No	Stand-alone 1 No No No Std. No No	Stand-alone 1 No No No Std. No No	Stand-alone 1 No No No Std. No No	Stand-alone 1 No No No Std. No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	256/480/960/ 1440/1920 8 x 32; 6 to 24 x 80 1.5/3/4.5/6 x 9 64 5 x 7 dot matrix	1920 24 x 80 6 x 9 64; 128 opt. 5 x 7 dot matrix	960/1440/1920 12/18/24 x 80 3/4.5/6 x 9 64 5 x 7 dot matrix	1440/1920 18/24 x 80 4.5/6 x 9 64 5 x 7 dot matrix	1920 24 x 80 6 x 9 127 5 x 7/9 dot matrix
<b>KEYBOARD</b> Style Character set Program function keys Numeric keypad Detachable keyboard	Typewriter ASCII — Opt. Std.	Typewriter ASCII None Opt. Std.	Typewriter ASCII None Opt. Std.	Typewriter ASCII None Opt. Std.	Typewriter ASCII 11 std. Std. Std.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase Roll Protected format Partial screen format Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	Rt. only No No No Screen only Std., up only No No No No Std. No No No Std. —	U, D, L, R, H, Rt. Std.; non-blink opt. No No Char., line, screen Std., up only No No No Std., address. only Std. No No No Std. —	U, D, L, R, H, Rt. No No No Char., line, screen Std., up only No Std. No No Std. Std. No No Std. —	U, D, L, R, H, Rt. No No No Char., line, screen No Std. Std., address. only Std. Std. No No Std. —	U, D, L, R, H, Rt. Opt. Opt. Opt. Char., line, screen Std., up only Std. Std. Opt. Std., address. only Std. Std. 2 std. No Std. —
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None RS-232 interface None None	None None RS-232 interface None None	None None RS-232 interface None None	None None RS-232 interface None None	None None RS-232 interface None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Asynchronous ASCII ASCII 50 to 4800 Char. only No Opt. Std. Opt. No	Half/full duplex Asynchronous ASCII ASCII 50 to 9600 Char. only No No Std. Opt. No	Half/full duplex Asynchronous ASCII ASCII 50 to 1800 Char./block No No Opt. Std. Opt. No	Full duplex Asynchronous ASCII ASCII 50 to 9600 Block Std. No Std. Opt., 1200 bps No	Half/full duplex Async./sync. ASCII ASCII 50 to 9600 Char./block Opt. Opt. Std. Opt. No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	65 65 1,375 to 1,555 — — — 2/72 —	65 to 75 65 to 75 1,555 to 1,705 — — — 1/75 —	75 75 1,775 to 1,895 — — — 9/70 —	— — 2,035 to 2,095 — — — 10/72 —	85 to 95 85 to 95 2,080 to 2,480 — — — 7/73 —
Serviced by	Datamedia	Datamedia	Datamedia	Datamedia	Datamedia
<b>COMMENTS</b>	Also available as RO unit using ASCII or Baudot				



## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Data 100 Model 73	Datapoint 1100	Datapoint 3000 & 3300	Datapoint 3360	Datapoint 3600
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 1 No No No Std. No No	Stand-alone 1 No Yes Yes Yes, via program Yes, via program Yes, via program	Stand-alone 1 No No No Std. No No	Stand-alone 1 No No No No Std. No	Stand-alone 1 No No No No Std. No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	960/1920 12/24 x 80 6 x 9 64 5 x 7 dot matrix	960 12 x 80 3.5 x 7 94 5 x 7 dot matrix	1800 25 x 72 7.5 x 10 64 5 x 7 dot matrix	2048 25 x 82 5 x 8 64 5 x 7 dot matrix	1920 24 x 80 5 x 8 94 5 x 7 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Teletype  ASCII No Std. No	Typewriter  ASCII None Std. No	Typewriter  ASCII None Std. No	Typewriter  ASCII None Std. No	Typewriter  ASCII None Std. No
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H  No No No No  Std., up only No Std. Std. Std., address. only Std. No No No No Std. None	U, D, L, R, H, Rt.  Std. Std. Std. Std.  Std., up only No No Std. Std., address. only No No No No Std. —	U, D, L, R, H, Rt.  Std. No No Std.  Std. No No No No Std. None	U, D, L, R, H, Rt.  Std. No No Std.  No No Opt. Std. No No No Std. None	U, D, L, R, H, Rt.  Std. No No Std.  Std., up only No No No Std., address. only No No No No Std. None
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None RS-232 interface None None	Dual drive std. 4 spindles std. Impact None Disk, tape drives, card reader	None None Impact None None	None None Impact None None	None None Impact None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half duplex Async./sync. ASCII ASCII/BSC 110 to 1200  Char. only No No Std. No No	Half/full duplex Async./synch. Any Any Up to 9600  Char./block Std. Opt. Std. Opt. Opt.	Half/full duplex Asynchronous ASCII ASCII 110 to 2400  Char. only No No Opt. No Opt.	Half/full duplex Asynchronous ASCII ASCII 300 to 4800  Block No No Std. No Opt.	Full duplex Asynchronous ASCII ASCII 110 to 9600  Char. only No No Std. No Opt.
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date  Served by	105 97 3,360 — — — 8/70 —  Data 100	183 to 215 165 to 294 7,200 to 8,040 — — — 1/74 2,000  Datapoint	— — 2,400 to 3,240 — — — 1968/1970 6,000  Datapoint	— — 3,900 — — — 1/70 500  Datapoint	67 60 1,950 — — — 12/74 100  Datapoint
<b>COMMENTS</b>		Minicomputer-based unit. See Report 70D-315-01 for details			

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Delta Data Systems 5000/APL, 5100, 5200, & 5500	Delta Data Systems Model 5300	Delta Data Systems Model 4000	Digi-Log Model 209 TeleComputer	Digi-Log Model 33
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 1 or 64 via mux. No No No Std. Opt. No	Stand-alone 1 or 64 via mux. No Opt. Opt. No Std. Opt.	Stand-alone 1 or 64 via mux. No Opt. No Std. Opt. Opt.	Stand-alone 10 Std., 10 lbs. No No Std. No No	Stand-alone 10 Std., 10 lbs. No No Std. No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	1024 to 3072 27 x 80 6 x 11 64; 96 opt. 7 x 9 dot matrix	2160 27 x 80 6 x 11 64 7 x 9 dot matrix	2048 25 x 80 6 x 11 224 5 x 7 dot matrix	640 16 x 40 Variable 64 5 x 7 dot matrix	1280 16 x 80 Variable 64 5 x 7 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Teletype  ASCII/APL Opt. Std. Opt.	Teletype  ASCII/APL None Opt. Opt.	Typewriter  ASCII; others opt. Std. Std. Opt.	Teletype  ASCII None None No	Teletype  ASCII None None No
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  Std. Std., except 5100 Std., except 5100 Char., line, field, screen Std., up & down Std. Std. Std. Std. Std. Std. No Opt. Std. Paging	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, field, screen Std., up & down Std. Std. Std. Std. Std. No Std. Std. Paging	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, field, screen Std., up & down Std. Std. Std. Std. No Std. Std. —	U, D, L, R, H, Rt.  Opt. No No Char., screen Std., up only No No No Std., address. only Std. Opt. No No Opt. None	U, D, L, R, H, Rt.  Opt. No No Char., screen Std., up only No No No Std., address. only Std. Opt. No No Opt. None
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	Single/dual drive Opt. Impact/non-impact Opt., except 5500 Multiplexer with 16 to 64 channels	Single/dual drive Opt. Impact/non-impact Opt. Multiplexer with 16 to 64 channels	RS-232 interface RS-232 interface Impact/non-impact None Multiplexer with 16 to 64 channels	RS-232 interface RS-232 interface RS-232 interface None None	RS-232 interface RS-232 interface RS-232 interface None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Asynchronous ASCII ASCII 110 to 9600  Char./block Opt. Opt. Std. Opt. Opt.	Half/full duplex Async./sync. EBCDIC/ASCII ASCII/BSC 1200; 2400 opt.  Char./block Std. No. Std. Opt. Opt.	Half/full duplex Async./sync. EBCDIC/ASCII ASCII; others opt. ASCII; others opt. 110 to 9600  Char./block Opt. Opt. Std. No Opt.	Half/full duplex Asynchronous ASCII ASCII 75 to 9600  Char. only No No Std. Opt. Opt.	Half/full duplex Asynchronous ASCII ASCII 75 to 9600  Char. only No No Std. Opt. Opt.
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	155 to 200 135 to 185 2,800 to 3,400 150 to 174 135 to 157 3,750 to 4,350 1970 4,000	155 to 200 135 to 185 2,800 to 3,400 150 to 174 135 to 157 3,750 to 4,350 1970 200	155 to 178 137 to 157 3,000 to 3,870 — — — 2/75 —	— — — — — 1,195 to 1,695 9/72 1,200	— — — — — 1,295 to 1,720 9/72 Over 800
Serviced by	Delta & GTE	Delta & GTE	Delta & GTE	Digi-Log	Digi-Log
<b>COMMENTS</b>	MultiTerm 2 is a microprocessor-based multiplexer with up to 64K of memory and software emulators for IBM 2260/2265 & 3270	Microprocessor-based unit; quantity discounts available for 6 or more units	Microprocessor-based unit; quantity discounts available for 6 or more units	A portable controller that uses separate monitor and keyboard (included in higher cost above)	A portable controller that uses separate monitor and keyboard (included in higher cost above)

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Digi-Log Series 300	Digi-Log Series 400	Digi-Log Series 3300 Microterm	Digital Equipment Model VT-50	Four-Phase Systems System IV/40
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 10 Std., 10 lbs. No No Std. No No	Stand-alone 10 Std. No (by vendor) Yes, minicomputer Yes, via microprog. Yes, via microprog. Opt., via micro- prog.	Stand-alone 1 No No (by vendor) Yes, minicomputer Yes, via microprog. Yes, via microprog. Yes, via microprog.	Stand-alone 1 No No Yes Std. No No	Cluster 16 No Std. No Std. Std. Std.
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	640/1280 16 x 40/80 Variable 63 5 x 7 dot matrix	640/1280 16 x 40/80 Variable 128 5 x 7 dot matrix	1920 24 x 80 Variable 128 5 x 7/9; 7 x 9 dot	960 12 x 80 8.7 x 4.3 64 5 x 7 dot matrix	1152/1920 24 x 48/80 7.25 x 10.25 125 7 x 9 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	No keyboard — — — —	No keyboard — — — —	Typewriter  ASCII 10 opt. Opt. Opt.	Typewriter  ASCII 4 std. No No	Typewriter/data entry ASCII/EBCDIC 12 std. Std. Std.
<b>FEATURES</b> Cursor positioning: Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  Opt. No No Char., screen  Std., up only No No No Std., address. only No Opt. No No Opt. None	U, D, L, R, H, Rt.  Opt. No No Screen  Std., up only No No No No Std. No No Opt. None	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std., up only Std. Std. Std. Std. Std. Std. 2 std. Std. Opt. Word wraparound, underscore	U, D, L, R, H, Rt.  Std. No No Line, screen  Std., up only Std. No Std. No No No Std. —	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std. Std. Std. Std. Std. Std. 3 opt. No Opt. Format storage
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	RS-232 interface RS-232 interface RS-232 interface None None	RS-232 interface RS-232 interface RS-232 interface None None	RS-232 interface RS-232 interface RS-232 interface None None	None None Std., non-impact None None	None Opt. Impact None Disk drive, others
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Asynchronous ASCII ASCII 110 to 9600  Any No No Std. No No	Half/full duplex Async./sync. ASCII/EBCDIC ASCII/BSC 50 to 9600  Any No No Std. No No	Half/full duplex Async./sync. ASCII ASCII/BSC 75 to 9600  Char./block Opt. No Opt.; 20/60 ma.opt. Opt. Opt.	Half/full duplex Asynchronous ASCII ASCII 75 to 9600  Char. only No Std. No Opt.	Half/full duplex Async./sync. ASCII/EBCDIC ASCII/BSC Up to 9600  Char./block Std. Std. Std. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	— — — — — 790 to 1,100 3/74 Over 200	— — — — — 1,995 12/74 Over 100	— — 2,100 to 5,000 — — — 9/73 700	— — 1,250 — — 60 9/74 —	45 to 51 43 to 49 (3-yr.) 1,845 to 2,075 375 to 890 339 to 810 17,325 to 41,850 7/73 Over 1,000
Serviced by	Digi-Log	Digi-Log	Digi-Log	DEC	Four-Phase
<b>COMMENTS</b>	Portable controller; uses separate monitor and key- board (included in higher cost above)	Hard-wired controller	Microprocessor- based unit; PROM microprogram designed to user's specifications	Provides local copy of displayed data via integral printer	Minicomputer- based system with disk or diskette storage and up to 72K bytes of memory; pricing does not include printers. Also see Report 70D-435-02

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Four-Phase Systems System IV/70	Genesis One Model G77 "The Plug"	GTE Information Systems IS/7801, IS/7801A, & IS/7802	GTE Information Systems IS/7700 & IS/7701	GTE Information Systems IS/7100
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Cluster 32 No Std. Std. Std. Std. Std.	Cluster 32 Opt. No No No No Std.	Cluster 5/26 No No (by vendor) IS/7802 only No No Std.	Cluster 24 No No IS/7701 only No Std. No	Stand-alone 1 No No No No Std. No.
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	1152/1920 24 x 48/80 7.25 x 10.25 125 7 x 9 dot matrix	1920 24 x 80 14-inch diag. 94 5 x 7 dot matrix	240/480/960/1920 6/12x40;12/24x80 7.5 x 9.5 128 5 x 7 dot matrix	240/480/960/1920 6/12x40;12/24x80 7.5 x 9.5 64 5 x 7 dot matrix	240/480/960/1920 6/12x40;12/24x80 7.5 x 9.5 64 5 x 7 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter/data entry ASCII/EBCDIC 12 std. Std. Std.	Typewriter/data entry EBCDIC Std. Opt. Std.	Typewriter/data entry/console ASCII/EBCDIC 12 std. None Std.	Typewriter/data entry ASCII None None Std.	Typewriter/data entry ASCII None None Std.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std. Std. Std. Std. Std. Std. Std. 3 opt. No Opt. Format storage	U, D, L, R, H, Rt.  Opt. Std. No Char., field, screen  No Std. Std. Std. Std., address. only Std. No 2 std. No Opt. —	U, D, L, R, H, Rt.  Std. Std. No Char., field, line, screen  No Std. No Std. Std. Std., field only 2 std. Std. Std. Double-width chars., line drawings	U, D, L, R, H  No Std. No Char., field, line, screen  No Std. Std. Std., address. only No Std. No No No None	U, D, L, R, H  No Std. No Char., field, line, screen  No Std. Std. Std., address. only No Std. No No No None
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None Opt. Impact None Card reader, disk and tape drives	None None Impact Opt. ID card reader	None None Impact Opt. None	None None Impact None None	None None Impact None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Async./sync. ASCII/EBCDIC ASCII/BSC Up to 9600  Char./block Std. Std. Std. No No	See Comments — — — —  — — — — —	Half duplex Synchronous ASCII/EBCDIC BSC 1200 to 9600  Block Std. No Std. No No	Half duplex Asynchronous ASCII ASCII 1200 to 9600  Block Std. No Std. No No	Half duplex Asynchronous ASCII ASCII 1200 to 9600  Block Std. No Std. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	45 to 51 43 to 49 (3-yr.) 1,845 to 2,075 370 to 1,510 348 to 1,372 (3-yr.) 16,000 to 64,250 2/71 Over 10,000	— 113 3,800 — — — 1/75 50	— 47 (1st 8); 117 1,535 (1st 8); 2850 — 700 (01); 738 (02) 17,120 to 18,000 2/75; 4/75 (01A) 2,500	— Controller & disp. costs are combined — 148 to 213 12,235 to 12,335 4/72 5,000	— 78 to 114 4,680 to 4,980 — — — 6/72 1,500
Serviced by	Four-Phase	Sorbus	GTE/IS	GTE/IS	GTE/IS
<b>COMMENTS</b>	Minicomputer-based system; up to 96K bytes of memory; extensive software; pricing does not include I/O; see Report 70D-435-01	Replaces IBM 3277-2 Display Station; plugs into IBM 3271-2 (remote) or 3272-2 (local) Control Units. Also see Report 70D-458-01	Cluster limit for IS/7801A is 5. Prices for clusters over 8 for 7801/02 are substantially higher. Contact vendor for 7801A pricing	Supports up to 12 buffered printers at 30 to 165 cps	Supports one printer

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Hazeltine 1000 and 1200	Hazeltine 2000	Hazeltine 3000	Hendrix 5200/5200B	Hendrix 6000 Series
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270/-compatible	Stand-alone 1 No No No Std. No No	Stand-alone 1 No No No Std. No No	Either 16 No No No No No No	Stand-alone 1 No No No No No No	Cluster 8 No Opt. No Opt. No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	960; 1920(H-1200) 12 or 24x80(1200) 4.6 x 9.2 64; 96 opt. 5 x 7 dot matrix	1998/2000 27 x 74; 25 x 80 5.75 x 8.5 64; 96 opt. 5 x 7 dot matrix	1998 27 x 74 5.75 x 8.5 64; 96 opt. 5 x 7 dot matrix	3072 32 x 96 17-inch diag. 128; 256 7 x 9 dot matrix	1296 18 x 72 12-inch diag. 256 7 x 9 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Teletype  ASCII None None No	Teletype  ASCII None Std. Std.	Teletype  ASCII None Std. Std.	Typewriter  TTS None None No	Typewriter  TTS Over 30 None No
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	D, R, H, Rt.  No No No Screen only  Std., up only No No No No No No No Std.	U, D, L, R, H, Rt.  No Std. Std. Screen only  Std., up only Std. Std. Std. Std., address. only Std. Opt., field only 2 std. No Std.	U, D, L, R, H, Rt.  No Std. Std. Screen only  Std., up only Std. Std. Std. Std., address. only Std. Opt., field only 2 std. No Std. Message waiting indicator	U, D, L, R, H, Rt.  Std. Std. Std. Std.  Std. No Std. Opt. Std. Std. No 2 std. plus 2 opt. Std. No	U, D, L, R, H, Rt.  Std. Std. Std. Std.  Std. Std. Std. Opt. Std. Std. 2 std. plus 2 opt. Std. Std.
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None Opt. (H-1200) None None	Dual drive None Impact/non-impact None Remote monitors	Dual drive None Impact/non-impact None Remote monitors	None None None None Paper tape reader, punch	None None Opt. None Paper tape reader, punch; 2.4M-byte disk
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Asynchronous ASCII ASCII 110 to 9600  Char. only No No Std. No Opt.	Half/full duplex Asynchronous ASCII ASCII 110 to 9600  Char./block No No Std. No Opt.	Half/full duplex Async./sync. ASCII Any 110 to 9600  Char./block Std. No Std. No Opt.	Half/full duplex Asynchronous TTS/ASCII — 110 to 9600  Char. only No No Opt. No No	Half duplex Asynchronous — 110 to 9600  Char. only No No Opt. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	49; 65 (H-1200) — 1,495; 1,590(1200) — — — 6/73; 10/74(1200) NA	98 2,995 — — — 10/70 Over 18,000	125 110 3,900 50 to 75 — 1,200 to 1,800 3/74 —	— — 11,900 to 14,900 — — 1970 —	— — 5,900 — — 32,300 to 79,900 1972 —
<b>Serviced by</b>	Syntonic	Syntonic	Syntonic	Hendrix	Hendrix
<b>COMMENTS</b>	Options include answerback and 202C or current loop interface	Options include answerback and 202C or current loop interface	Microprocessor-based unit uses vendor-programmed ROM	Designed for text editing	Designed for text editing and text publishing



## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Hewlett-Packard Model 2640A	Honeywell MTS 7500	Honeywell VIP 7700	IBM 3277 Information Display System	IBM 3275 Information Display System
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 1 No No HP minicomputers Std. No No	Either 8 No Std. No Opt. No No	Either 10 No No Yes, Honeywell No No No	Cluster 32 No No 3272/3277 No No —	Stand-alone 1 No No No No No —
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	1920 24 x 80 5 x 10 64; up to 512 opt. 9 x 15 dot matrix	960 12 x 80 3.5 x 7 94 5 x 7 dot matrix	960/1920 12/24 x 80 5.5 x 8.5 63; 96 opt. 5 x 7 dot matrix	480/1920 12 x 40; 24 x 80 14 (diagonal) 64 7 x 9 dot matrix	480/1920 12 x 40; 24 x 80 14 (diagonal) 64 7 x 9 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter  ASCII 8 std. Std. Std.	Typewriter  ASCII 2 std. Yes No	Typewriter  ASCII 36 opt. Std. No	Several  ASCII/EBCDIC Std. Std. Std.	Several  ASCII/EBCDIC Opt. Std. Std.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H  Std. Std. Std. Screen, field  Std., up & down Std. Std. Std. Std.; abs. or rel. Std. Std. 2 opt. Std. Std. Paging (by 24 lines), scrolling, underscore	U, D, L, R, H, Rt.  Std. Std. Std. Std.  Std., up only Yes No Std. Std. Std. No No Std.	U, D, L, R, H, Rt.  Std. Std. Std. Std.  No Std. Std. Std. Std., address. only Std. Std. No No No Char. & field blanking, inhibit field transmission	U, D, L, R  No Std. No Char., field, line, screen No Std. Std. Std. Std., address. only Std. No 2 std. No Opt. —	U, D, L, R  No Std. No Char., field, line, screen No Std. Std. Std. Std., address. only Std. No 2 std. No Opt. —
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None None None None	Dual drive None Impact None Disk drive, 2.5M bytes	Dual drive None Impact None ID card reader, security keylock	None None IBM 3284/3286 Opt. Operator ID card reader	None None IBM 3284/3286 Opt. Operator ID card reader
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Asynchronous ASCII ASCII 110 to 2400  Char./block No No Std. No No	Half duplex Synchronous ASCII Honeywell 110 to 9600  Char. only Std. No Std. Std. No	Half duplex Synchronous ASCII Honeywell 2000 to 4800  Block Std. Std. Std. No No	Half duplex Synchronous ASCII/EBCDIC BSC/SDLC 1200 to 7200  Block Std. No Std. No No	Half duplex Synchronous ASCII/EBCDIC BSC/SDLC 1200 to 7200  Block Std. No Std. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	Full pay-out lease Available 3,000 to 4,000 — — — 1/75 —	301 250 (3-yr.) 9,800 — — — 1973 NA	157 to 285 135 to 242 (3-yr.) 4,860 to 8,770 98 85 (5-yr.) 3,025 10/73 Over 2,000	97 to 199 — 4,072 to 7,732 178 to 702 — 6,630 to 17,964 2nd atr. 1972 —	145 to 292 — 6,222 to 12,072 — — — 2nd qtr. 1972 —
Serviced by	Hewlett-Packard	Honeywell	Honeywell	IBM	IBM
<b>COMMENTS</b>	Microprocessor-based unit; basic unit includes 1K-byte display memory, expandable to 8K bytes	Manufactured by Datapoint as the Datapoint 1100 (Report 70D-315-01)		Prices include all options except cost of printers. Also see Report 70D-491-11	Prices include all options except cost of printers. Also see Report 70D-491-11



## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	IBM 2260 Display Station	IBM 2265 Display Station	IBM 3790 Communication System	Incoterm SPD 325	Incoterm SPD 320
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Cluster 24 No No Std. No — No	Stand-alone 1 No No No No — No	Cluster 16 No Std. No No No No	Stand-alone 2 No No No No Std.	Cluster 8/16 No No No No No No Std.
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	240/480/960 6/12 x 40; 12 x 80 4 x 9 64 5 x 7 dot matrix	960 15 x 64; 12 x 80 4.6 x 10.3 64 Stroke	480/1920 12 x 40; 24 x 80 14 (diagonal) 64 7 x 9 dot matrix	480/960/1920 12/24 x 40/80 6.5 x 9 64 7 x 10 dot matrix	480/960/1920 12/24 x 40/80 6.5 x 9 64 7 x 10 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter/ numeric ASCII None Opt. Std.	Typewriter  ASCII None None Std.	Typewriter  ASCII/EBCDIC Opt. Std. Std.	Typewriter  EBCDIC 24 std. Std. Std.	Typewriter  EBCDIC 24 std. Std. Std.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R  No No No Screen; line opt.  No Std. Std. Opt. Opt., address. line No No No No No —	U, D, L, R  No No No Line, field, screen  No Std. Std. Opt. Opt., address. line No No No No Opt. destructive cursor	U, D, L, R  No Std. No Char., field, line, screen  No Std. Std. Std. Std., address. only Std. No 2 std. No Opt. —	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  No Std. Std. Std. Std. Std. 2 std. No Opt. None	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  No Std. Std. Std. Std. Std. 2 std. No Opt. None
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None IBM 1053 None None	None None IBM 1053 None None	None None IBM 3793 Opt. Operator ID card reader	None None Impact None None	Single drive None Impact None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half duplex Asynchronous ASCII ASCII 1200/2400  Block Std. No Std. No No	Half duplex Asynchronous ASCII ASCII 1200/2400  Block Std. No Std. No No	Half duplex Synchronous EBCDIC SDLC 1200/2400  Block Std. No Opt. Opt. No	Half/full duplex Synchronous ASCII/EBCDIC BSC/SDLC 1200 to 9600  Block Std. No Std. No No	Half/full duplex Synchronous ASCII/EBCDIC BSC/SDLC 1200 to 9600  Block Std. No Std. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	40 to 69 — 1,295 to 2,179 407 to 1,632 — 17,530 to 79,316 6/66 —	202 — 6,448 173 to 262 — 8,460 to 12,442 4/69 —	See Comments See Comments See Comments — — — 1st qtr. 1975 —	Contact vendor Contact vendor Contact vendor — — — 1974 —	Contact vendor Contact vendor Contact vendor Contact vendor Contact vendor Contact vendor 1974 —
Serviced by	IBM	IBM	IBM	Incoterm	Incoterm
<b>COMMENTS</b>	Prices do not include cost of printer. Also see Report 70D-491-05	Prices do not include cost of printer. Also see Report 70D-491-06	Remote shared-processor data entry system. Pricing is complex and depends upon system configuration; see Report 70D-491-42		

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Incoterm SPD 10/20	Incoterm SPD 10/25	Incoterm SPD 20/20	Infoton Vistar & Vistar 2	Infoton Vistar/GT
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 2 No Std. No Opt. Opt. No	Stand-alone 2 No Std. No Opt. Opt. Std., IBM 3275	Cluster 16 No Std. No Opt. Opt. Opt.	Stand-alone 1 No No No Std. No No	Stand-alone 1 No No No Std. No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	960/1920 15/30 x 64 6.5 x 9 64; 121 opt. 7 x 10; 8 x 10 (opt.) dot	960/2000 12/25 x 80 6.5 x 9 64; 128 opt. 7 x 10; 8 x 10 (opt.) dot	960/1920 12/24 x 80 6.5 x 9 64; 128 opt. 7 x 10; 8 x 10 (opt.) dot	1920 24 x 80 9 x 7 64 5 x 7 dot matrix	1920 24 x 80 9 x 7 64 5 x 7 dot matrix
<b>KEYBOARD</b> Style Character set Program function keys Numeric keypad Detachable keyboard	Several Several 24 Opt. Std.	Several Several 24 Opt. Std.	Several Several 24 Opt. Std.	Data entry ASCII None Std. No	Data entry ASCII None Opt. No
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt. Opt. Opt. Opt. Opt. Opt. Opt. Opt. Std. Opt. Opt. Opt. No No Opt. —	U, D, L, R, H, Rt. Opt. Opt. Opt. Opt. Opt. Opt. Opt. Std. Opt. Opt. Opt. 2 std. No Opt. —	U, D, L, R, H, Rt. Std. Opt. Opt. Opt. Opt. Opt. Opt. 2 std. No Opt. —	U, D, L, R, H, Rt. Std. Std. Std. Char., field, line, screen Std., up only Std. Std. Std., Vistar 2 only No 2 std. No Std. None	None Std. Std. No Screen only Std., up only No No No Std. No No Std. None
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	Single/dual drives Single/dual spindle Impact None Card readers & punches; mag. tape drives	Single/dual drives Single/dual spindle Impact None Card readers & punches; mag. tape drives	Single/dual drives Single/dual spindle Impact None Card readers & punches; mag. tape drives	None None None Opt. Opt.	None None None None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Async./sync. ASCII/EBCDIC BSC/SDLC Up to 9600 Char./block Opt. Opt. Std. No No	Half/full duplex Async./sync. ASCII/EBCDIC BSC/SDLC Up to 9600 Char./block Opt. Opt. Std. No No	Half/full duplex Async./sync. ASCII/EBCDIC BSC/SDLC Up to 9600 Char./block Opt. Opt. Std. No No	Half/full duplex Asynchronous ASCII ASCII 75 to 9600 Char./block Opt., Vistar 2 No Std. No No	Half/full duplex Asynchronous ASCII ASCII 75 to 9600 Char. only No No Std. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date Served by	210 (1); 265 (2) — 6,090(1); 7,875(2) — — — 6/70 Over 8,000 Incoterm	240 (1); 305 (2) — 7,405(1); 9,030(2) — — — 11/74 — Incoterm	— 60 1,665 — 355 10,105 4/74 — Incoterm	— — 2,295; 2,395 (2) — — — 2/73; 3/75 (2) 3,000 (Vistar) Optical Scanning	— — 1,595 — — — 12/73 Over 1,500 Optical Scanning
<b>COMMENTS</b>	Extensive software support includes emulators and assemblers; up to 32 displays per line via multiplexer. Also see Report 70D-495-01	Alternate display format is 15/31 x 64	Extensive software support includes emulators and assemblers; alternate display format is 15/30 x 64. Also see Report 70D-495-01	Switch-selectable speeds; 20/60 ma. interface also std.	Switch-selectable speeds; 20/60 ma. interface also std.

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Infoton Vistar Plus	Interface Technology Model 736	International Com- munications Corp. ICC 40+ Data Display System	ITT Model 3501 Asciscopes	ITT Model 3100 Alphascope
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Either 64 No No No Std. No No	Stand-alone 1 No No No Std. No No	Stand-alone 1 No No Yes Opt. No No	Stand-alone 1 No No No Std. No No	Either 1/4/8/16/32 No No Yes, IBM No Std. No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	400/800/1600 10/20 x 40/80 5.5 x 8.7 64 5 x 7 dot matrix	4/8/12/16 1 x 16 0.3-inch high chars. 15 7-segment LED's	1920 24 x 80 5.75 x 10.5 127 7 x 11 dot matrix	960 12 x 80 5 x 8 65 5 x 7 dot matrix	240/480/960/ 1360/1920 6/12/17/24 x 40/80 5 x 8 65 5 x 7 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Data entry  ASCII None Std. No	Numeric block  Numerics only 2 std. — No	Typewriter  ASCII Opt. None Std.	Teletype  ASCII None None No	Typewriter  ASCII None Opt. No
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  Std. Std. Std. Field, screen  Std. Std. Std. No Std. Both std. No No Std. None	—  No No No No  No No No No No No Opt. —	U, D, L, R, H, Rt.  No Std. Std. Char., line, screen  Opt. Opt. Std. Opt. Opt., address. only Std. Both opt. 2 std. Std.; cursor only Std. Calculate, paging	U, D, L, R, H, Rt.  Std. No No Char., screen  Std. Std. Std. No Std. No No No Std. None	U, D, L, R, H, Rt.  Std. Std. No Char., line, screen  No Opt. Std. Std. No Std. No No No Std. None
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None RS-232 interface Opt. —	None None None None Opt. interface	None None Impact None None	None None Impact/non-impact None None	None None Impact/non-impact None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Async./sync. ASCII ASCII 110 to 4800  Block Opt. No Std. No No	Half/full duplex Asynchronous ASCII ASCII 110/300  Char. only No No Std. No Opt.	Half/full duplex Async./sync. ASCII ASCII Up to 2400  Char./block Opt. Opt. Std. Opt. No	Half/full duplex Asynchronous ASCII ASCII 110/300/1200/ 2400 Char./block No No Std. Std. Std.	Half duplex Asynchronous ASCII ASCII 1200/2400/4800  Block Std. No Std. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	— — 3,395 to 3,745 — — — 7/71 Over 2,000	— — 600 — — — 8/74 60	145 128 3,850 — — — 2/75 30	65 — 2,195 — — — 12/72 1,000	40 to 45 — 1,200 to 1,400 95 to 1,920 — 6,150 to 68,525 9/70 1,000
Serviced by	Infoton	Interface Technology	ICC	ITT	ITT & 3rd party
<b>COMMENTS</b>	Switch-selectable speeds; 20/60 ma. interface also std.; 8-channel concentrator expandable to 64 channels	Terminal contains an LED display and numeric keyboard			

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Jacquard J100 & J105	Kustom MCT-10	Lear Siegler Model 7700A	Lear Siegler ADM-1	Lear Siegler ADM-2
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Either 30 J105's per J100 No Std. IBM 360/70, Univac Std. No Opt.	Stand-alone 1 No; mobile No No No No No	Stand-alone 1 No No No Std. No No	Stand-alone 1 No No No Std. No No	Stand-alone 1 No No No Std. No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	1920 24 x 80 8 x 10 96 5 x 7 dot matrix	256 8 x 32 3.38 x 9.18 64 5 x 7 dot matrix	2000 25 x 80 6 x 9 64 5 x 7 dot matrix	960/1920 12/24 x 80 6 x 9 96 5 x 7 dot matrix	1920 24 x 80 6 x 9 128 7 x 9 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter  ASCII 85 Std. Std.	Typewriter  ASCII 11 std. None No	Typewriter  ASCII None Opt. Opt.	Teletype  ASCII None Opt. No	Teletype  ASCII 16/32 Std. Opt.
<b>FEATURES</b> Cursor positioning: Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H  Std. Std. Std. Char., line, screen  Std. Std. Std. Std. Std. Std. 2 opt. No Opt. 8 programmable lamp indicators	U, D, L, R, H  Std. No No Screen only  No Std. Std. No No No Std. None	U, D, L, R, H, Rt.  Std. Std. Std. Std.  Std. Yes Std. Yes Std. Std. 2 std. Std.	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std. Std. Std. Std. Std. Std. 2 std. No Opt.	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std. Std. Std. Std. Std. Std. 2 std. No Opt.
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	Yes Yes Impact Opt. Several	None None Non-impact None None	None None Non-impact None None	None None RS-232 interface None None	None None RS-232 interface None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Async./sync. ASCII/EBCDIC ASCII/BSC/SDLC 110 to 9600  Char./block Std. Opt. Std. Opt.	Half/full duplex Synchronous ASCII ASCII 866/1300  Block Std. Std. No Std. No	Half/full duplex Asynchronous ASCII ASCII 110 to 9600  Char./block Opt. No Std.; 20/60 ma.opt. Opt.	Half/full duplex Asynchronous ASCII ASCII Up to 19,200  Char./block Opt. No Std.; 20 ma. opt. No	Half/full duplex Asynchronous ASCII ASCII 110 to 9600  Char./block Opt. No Std.; 20 ma. opt. No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	— 100 to 120 1,950 to 2,350 — 220 to 1,300 4,400 to 25,400 3/74 20	— — 3,650 — 27,500 to 90,000 3/72 290	— — 2,795 to 2,895 — — 6/71 1,000	— — 1,600 — — 8/73 2,000	— — 2,500 — — 6/74 1,000
Serviced by	Jacquard & SirVess	Kustom	Lear Siegler	Lear Siegler	Lear Siegler
<b>COMMENTS</b>	J100 contains a CRT, keyboard, and minicomputer with up to 128K bytes of core memory	Mobile terminal for communication via two-way radio; contains plasma display		Up to 96 terminals can be multi-dropped	Up to 96 terminals can be multi-dropped

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Lear Siegler ADM-3	Megadata SiR-1000 U & SiR-1075/77	Megadata SiR-1000C-4/8	Megadata SiR-1000/WP	Microtech 8/640 & 8/640 II
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 1 No No No Std. No No	Either 8 to 32 Std. Std. — No No	Stand-alone 1 Std. Std. — Opt. Opt. Opt.	Stand-alone 1 No Opt. Yes Opt. Opt. Opt.	Stand-alone 1 No Std. No Opt. No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	960/1920 12/24 x 80 6 x 9 64 5 x 7 dot matrix	512/1024/1920/ 2160 8/16 x 64; 24 x 80 8 x 10 64; 128 opt. 7 x 8 dot matrix	1536/2160 64 x 24; 27 x 80 10 x 10 192 7 x 8 dot matrix	6400 80 x 80 10 x 12 192 8 x 12	640; 640/720 (II) 10 x 64; 15 x 48 — 64; 64-128 (II) 7 x 9 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Teletype  ASCII None Opt. No	Typewriter  ASCII Up to 51 Opt. Opt.	Typewriter  ASCII 51 Std. Opt.	Typewriter  ASCII 71 Opt. Opt.	Any  ASCII 8 std. Std. Opt.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	L, R, Rt.  No No No Screen only  Std. No No No No Std. No No No Yes Destructible or non-destructible cursor, keylock	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std. Std. Std. Text editing functions; graphics via a 10 x 10 dot matrix	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std. Std. Std. Std. Opt. Std. —	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std. Std. Std. Std. Std. 2 std. No Std. Search, word inhibit	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  No Std. Std. Std. Std. Std. 2 std. No Std. —
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	RS-232 interface RS-232 interface RS-232 interface None None	Opt. Single/dual spindle Yes Opt. Card reader, ID card reader	Yes Yes Yes None Card reader	Opt. Opt. Opt. Opt. Opt.	Std.; opt. (II) Opt., up to 4 (II) Opt. (II) No Disk and tape drives and others
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232 interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Asynchronous ASCII ASCII Up to 19,200  Char. only No No Std. No No	Half duplex Asynchronous ASCII ASCII Up to 19,200  Char./block Std. Opt. Std. Opt. Opt.	Half duplex Asynchronous ASCII ASCII Up to 19,200  Char./block Std. Opt. Std. Opt. Opt.	Half/full duplex Asynchronous ASCII ASCII Up to 13,000 char./sec. Char./block Std. Std. Std. Opt. Opt.	Half duplex Async./sync. ASCII; Any (II) ASCII; Any (II) 50 to 9600  Char./block Std. Opt., std. (II) Opt., std. (II) Opt. Opt.
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	— — 995 — — — 5/75 —	— — 4,500 to 7,500 — — 2,100 (multiplexer) 12/73 Over 150	— — 5,000 to 7,500 — — — 1973 Over 500	765 390 7,500 — — — 12/74 Over 100	— — Sold OEM only — — — — —
Serviced by	Lear Siegler	Megadata and C&W	Megadata and C&W	Megadata	—
<b>COMMENTS</b>		SiR-1000U replaces UNIVAC's Uniscope. Both units are designed for text editing, with the 1075/77 having the most capabilities	Data can be displayed in 4 or 8 colors	Designed for text editing (word processing)	Both terminals include memory: 8K bytes to 16K or 64K bytes (II only)



## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Microtech MSIS	NCR 796 Series Models 101, 201 & 301	Olivetti DE-520	Olivetti TCV 270	Omron 8025 A, B, & C
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Cluster 10 Opt. Std. Parallel interface No No No	Stand-alone 1 No No NCR 8200 (101) Std. No No	Stand-alone 1 No Opt. Std. Std. No No	Either 32 No Opt. No No Std. Std.	Stand-alone 1 No Opt., A; Std., B — Std., A & B No Std., C only
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	32 2 x 16 — 64 Dot matrix	1920 24 x 80 8 x 10 64 5 x 7 dot matrix	341 11 x 31 4.75 x 5.5 64; 96 opt. 5 x 7 dot matrix	480/1920 12 x 40; 24 x 80 12 inch diag. 96 7 x 9 dot matrix	1920 24 x 80 8 x 10 224 7 x 9 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Data collection  ASCII 13 std. Std. No	Typewriter  ASCII None Std. No	Typewriter  ASCII None Std. No	Typewriter/data entry ASCII/EBCDIC 12 opt. Opt. Std.	Typewriter/data entry ASCII/EBCDIC 16 std.; 48 opt. Std. Opt.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	No cursor  No No No No  No Std. Std. No No No No No No Std.	U, D, L, R, H  Opt., 101 only Std., 201 & 301 No Screen only  Std. Std., 201 & 301 Std., 201 & 301 Std. Std., 201 & 301 2 std., 201 & 301 No Std., 101; Opt., 201 Vector generation, 72 x 160 dots	L, R, H, Rt.  Std. No No Char., line, screen  No Std. Std. Std. Std. Std. Std., char. only No Std. None	U, D, L, R, H, Rt.  Std. Std. No Char., field, screen  No Std. Std. Std. Std. Opt., field only 3 std. No Std. —	U, D, L, R, H, Rt.  Std. Std. Delete std., C Char., line, screen  Std., A & B Std. Std. Std. Std. Field std., A & B 2 std. Std., A & B Std. Paging & scrolling
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	No Single spindle Opt. No Hand-held wand	None None Non-impact (NCR) None None	Single/dual drives Single/dual spindle Impact None Card reader, mag. tape unit, punched tape units	None Single/dual spindle Impact Opt. ID card reader	1 or 2 drives, A & B None Impact/non-impact None —
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half duplex Asynchronous ASCII ASCII 2400; 9600 paral.  Block Std. Std. Std. Opt. No	Half/full duplex Asynchronous ASCII ASCII 110 to 9600  Char./blk., 201/301 Std., 301 only Opt. Std. No Opt., 101 & 201	Half duplex Async./sync. ASCII/EBCDIC ASCII/BSC 110 to 4800  Block Opt. Opt. Opt. Opt.	Half duplex Async./sync. ASCII/EBCDIC ASCII/BSC 600 to 4800  Block Std. No Std. No No	Half/full duplex Async., A,B/sync., C ASCII/EBCDIC ASCII/BSC Up to 2400/9600 (C)  Char./block Opt., A&B; std., C Opt., A&B Std. Opt. Opt., A & B
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	— — Sold OEM only — — — — —	80 to 150 — 2,000 to 3,500 — — — 1/75 1,875 (all models)	165 to 350 157 to 332 6,100 to 14,000 — — — 2/71 13,000	99 to 196 94 to 189 3,620 to 6,440 120 115 3,800 10/74 —	— 85 to 370 3,250 to 14,300 — — — 12/73 Over 600
Served by	—	NCR	Olivetti	Olivetti	Omron & W.U.
<b>COMMENTS</b>	Data collection terminal for factory use; uses plasma (gas) display	All units manu- factured by ADDS as models 580 (101), 880 (201), and 880A (301)	Manufactured by Sycor, Inc. as Model 340; uses Olivetti TPS as- sembler-type language	Options include 6K RAM, check digit verification, and arithmetic and logical opera- tions	Microprocessor- based unit with up to 16K bytes of RAM in 2K or 4K increments; soft- ware support; Diablo HyType printer available



## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Intel OP-1	Intel 4000 Series	Pertec Model 7100	Plantronics ComSet DS-150A	Quotron Series 800
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Either 1 No Std. No Std. Opt. Opt.	Stand-alone 1 No No Yes, Burr. 3500 Std., some models No No	Stand-alone 1 Std. No (by vendor) No Std. No No	Stand-alone 1 No No No Std. No No	Cluster 24 No No No Opt. Opt. Opt.
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	1600/1920 20/24 x 80 7 x 10 112 5 x 7/9/10 dot matrix	1600 80 x 20 7 x 10 112 5 x 10 dot matrix	960/1920 12/24 x 80 5.5 x 8.25 64; 96 opt. 7 x 9 dot matrix	64 4 x 16 3-inch diag. 64 5 x 7 dot matrix	1200/1600 20 x 60/80 48 x 64; 6 x 8 96 14 x 22 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter  ASCII 19 std. Std. Std.	Typewriter  ASCII/APL None Std., some models	Typewriter  ASCII 5 std.; 11 opt. Opt. Std.	Touch-Tone; 12 keys DTMF 2 std. Std. Std.	Block/typewriter  ASCII 10 opt. None Std.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std. Std. Std. Std. Std. Std. 2 std. Std. Std.	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std. Std. Std. Std. Std. 2 std. Std. Std. 2nd page opt.; vector generation	U, D, L, R, H  Std. Std. Std. Screen; line opt.  Std. Std. Std. Std. Std. 2 std. No Std. —	No cursor  No No No Screen only  No No No No Std., field only No No No None	U, D, L, R, H, Rt.  Std. Opt. Opt. Char. & screen  No No Opt. Opt. Std., address. only Opt. No No No None
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	Single/dual drive None Impact No Cartridge disk drives (Diablo Series 20 & 30)	RS-232 interface No Impact/RS-232 No None	None None Impact None None	None None None None None	None Single spindle Impact/non-impact None Card reader, disk and mag. tape drives
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, b/pts/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Async./sync. opt. ASCII ASCII Up to 50,000  Char./block Std. Std. Std. Opt. No	Half/full duplex Async./sync. ASCII ASCII/Burroughs 110 to 9600  Block Std., Burr. only No Std. No No	Half/full duplex Async./sync. ASCII ASCII Up to 9600  Char./block Std. Std. Std. Opt. No	Half duplex Asynchronous ASCII/DTMF ASCII 110, 150, 300  Char. only No No Std. No	Half/full duplex Async./sync. ASCII/EBCDIC ASCII/BSC/Baudot 37.5 to 9600  Char./block Opt. No Std. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date  Served by	Sold OEM only — 2,285 (qty. 100) — — 3,670 (base) 11/74 100  Thrd party	— 3,395 to 4,360 — — — 12/73 Over 300  Intel	Sold OEM only — 2,235 to 2,638 (qty. 51 to 100) — — 4/74 Over 2,000  Pertec	See Comments — — — — 4/73 400  Local telephone co. Leased to user by local telephone co. for about \$30 to \$35 per month; unit attaches di- rectly to telephone set	— — 1,200 to 4,200 — — 26,000 to 90,000 9/71 6,000  Quotron
<b>COMMENTS</b>	Microprocessor- based unit with up to 16K bytes of RAM in 4K incre- ments; program- mable functions and operations	Microprocessor- based units; com- patible with Bur- roughs terminals or IBM 2741	Microprocessor- based unit; ROM microprogram to user's specifica- tions		Clustered terminal built around a free- standing minicom- puter; complete turnkey systems

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Randal Data Systems MM 50 & Mini/Maxi View	Raytheon Data Systems PTS-100	Research, Inc. Teleray Model 3311	Research, Inc. Teleray Models 3511 and 3711	Research, Inc. Teleray Model 3931
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 1 No No Yes Std. No No	Either 32 No Std. Yes, IBM 360/370 Opt. Opt. Opt.	Stand-alone 1 No No No Std. No No	Stand-alone 1 No No No Std. No No	Stand-alone 1 No No No Std. No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	960/1920 12/24 x 80 6 x 9 64; 128 (Maxi) 5 x 7; 5 x 7/9 (Maxi)	480/960/1920 12x40; 12/24x80 7 x 10 64; 96 opt. 7 x 7/9 dot matrix	1920 24 x 80 7.5 x 9.5 64 5 x 7 dot matrix	1920 24 x 80 7.5 x 9.5 64; 95 (3711) 5 x 7 dot matrix	1920 24 x 80 9.4 x 11.9 95 ASCII/APL 5 x 9 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter/data entry (Maxi) ASCII 2 std. (Maxi only) Opt., std. (Maxi) Std. (Mini & Maxi)	Typewriter  ASCII 10 std. Opt. Std.	Teletype  ASCII None Opt. Opt.	Teletype  ASCII None Opt. Opt.	Typewriter  ASCII/APL None Opt. Opt.
<b>FEATURES</b> Cursor positioning; Up, Down, Left Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial-screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	L, R, U, D, H, Rt.  Std.; opt., Maxi Std., Maxi only Std., Maxi only Char., line, screen  Std., up only Std., Mini & Maxi Std. Std. Std. Std., Mini & Maxi Std., Mini & Maxi Std. No Std.	U, D, L, R, H  No No No Field only  No Std. Std. Programmable Std. Std. Std. 2 std. No Opt. Programmable indicators	D, H, Rt.  No No No No  Std., up only No No No Std. No No Std. Double-width characters	D, L, R, H, Rt.  No No No Screen only  Std., up only No No Opt. No Std. No No Std. Double-width characters	D, L, R, H, Rt.  No No No Screen only  Std., up only No No Opt. No Std. No No Std. Double-width characters; APL overstrike
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	Single/dual drives Single/dual spindle Impact/non-impact None Opt.	7 drives max. None Impact/non-impact None Card reader, disk drive	None None RS-232 interface None TV monitor	None None RS-232 interface None TV monitor	None None RS-232 interface None TV monitor
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Async./sync. ASCII ASCII Up to 9600  Char./block Opt., Maxi only Opt., Maxi only Std. Opt., Maxi only Opt.	Half/full duplex Async./sync. ASCII/EBCDIC BSC Up to 9600  Block Opt. Opt. Opt. No Opt.	Half/full duplex Asynchronous ASCII ASCII 110 to 2400  Char. only No No Std. No Opt.	Half/full duplex Asynchronous ASCII ASCII 75 to 9600  Char. only No No Std. No Opt.	Half/full duplex Asynchronous ASCII ASCII 75 to 9600  Char. only No No Std. No Opt.
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	49 to 110 — 1,310 to 3,000 — — — 73(Maxi); 74(Mini) 700 (Maxi & Mini)	198 188 6,900 313 297 9,050 9/72 —	59 55 1,430 — — — 2/72 —	68; 80 (3711) 64; 76 (3711) 1,610; 1,880(3711) — — — 4/75; 9/74 (3711) —	103 96 2,490 — — — 3/75 —
Serviced by	RDS	Raytheon	RCA Service Co.	RCA Service Co.	RCA Service Co.
<b>COMMENTS</b>	MM50 is available with integral printer; limited graphics with Maxi	Controlled by minicomputer; alternate display formats are 15/30 x 64. Also see Report 70D-710-01	20 ma. current loop and TTL logic interfaces also available	20 ma. current loop and TTL logic interfaces also available	20 ma. current loop and TTL logic interfaces also available

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Sanders Data Systems 620 & 622 Data Display Systems	Sanders Data Systems 720 Data Display System	Sanders Data Systems 804 System	Sanders Data Systems 810 System	Sanders Data Systems 8041 System
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 1 No No Std. No Std. No	Cluster 12 No No Std. No Std. No	Stand-alone 1 No Std. Std. Opt. Opt. No	Cluster 8 No Std. Opt. Opt. Opt. No	Stand-alone 1 No Std. Opt. No No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	2688 40 x 52; 32 x 84 7.5 x 9.5 64 Stroke	2688 40 x 52; 32 x 84 7.5 x 9.5 64 Stroke	960/1920 12/24 x 80 7.5 x 9.5 64; 96 opt. 5 x 7 dot matrix	480/768/960/ 1536/1920 40/64/80 x 12/24 7.5 x 9.5 64; 96 opt. 5 x 7 dot matrix	1920 24 x 80 7.5 x 9.5 64 5 x 7 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter/data entry ASCII None None Yes	Several  ASCII None Opt. Yes	Typewriter/data entry ASCII Std. Std. Std.	Typewriter/data entry ASCII Std. Std. Opt.	Data entry  ASCII 13 std. Std. No
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	L, R, U, D, H, Rt.  Std. Std. No Char. only  No Std. Std. Std. Std. Std. Std. 2 std. No No No —	L, R, U, D, H, Rt.  Std. Std. Std. Char., line, screen  No Std. Std. Std. Std. Std. 3 std. No No No —	L, R, U, D, H, Rt.  Std. Opt. Opt. Opt.; char., line, screen Opt. Opt. Opt. Std. Std. Opt. No No Opt. —	U, D, L, R, H, Rt.  Std. Opt. Opt. Std.  Opt. Opt. Opt. Std. Std. Std. Std., field only No No No Opt. —	U, D, L, R, H, Rt.  Std. No No Std., field only  No Std. No Std. Std. Std., field only No No No Opt. —
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None Impact None None	None None Impact Opt. None	Dual drive None Impact Opt. Card reader	Dual drive None Impact None Card reader, disk drives	Dual drive None Impact None Card reader
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half duplex Async./sync. ASCII ASCII 110 to 2400  Char./block Std. No Std. No Opt.	Half duplex Async./sync. ASCII ASCII 110 to 9600  Char./block Std. No Std. No Opt.	Half/full duplex Async./sync. ASCII/EBCDIC ASCII/BSC 110 to 9600  Char./block Opt. Opt. Std. Opt. Opt.	Half/full duplex Async./sync. ASCII/EBCDIC ASCII/BSC 110 to 9600  Char./block Opt. Opt. Std. Opt. Opt.	Half duplex Synchronous ASCII/EBCDIC BSC 2400  Block No Opt. Std. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	200 to 220 120 to 175 (3-yr.) 5,900 to 6,100 — — — 1968/1970 (622) Over 1,500	100 to 131 65 (basic 3-yr.) 3,177 to 3,277 228 to 284 415 (basic 3-yr.) 7,088 to 18,000 1966 Over 5,000	210 (basic) 191 (basic 3-yr.) 5,630 (basic) — — — 12/71 Over 1,000	63 (basic) 57 (basic 3-yr.) 1,475 (basic) 186 (basic) 171 (basic 3-yr.) 6,900 (basic) 1/73 (basic) Over 400	352 (basic) 332 (basic) 12,800 (basic) — — — 12/71 Over 100
Serviced by	Sanders	Sanders	Sanders	Sanders	Sanders
<b>COMMENTS</b>			Also see Report 70D-734-01	Also see Report 70D-734-01	Emulates IBM 2780. Also see Report 70D-734-01

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Sanders Data Systems 8100/8108 System	Sanders Data Systems 8170 System	Scientific Measurement Systems SMS 1920	Selecterm ADDS 580	Selecterm ADDS 980
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Cluster 4/8 No Std. Opt. No No No	Cluster 32 No Std. Std., IBM 360/370 No No Std.	Stand-alone 1 Std. No No Std. No	Stand-alone 1 No No Std., minicomputer Std. No	Stand-alone 1 No No Std., minicomputer Std. No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	960/1920 12/24 x 80 7.2 x 9.6 64; 96 opt. 5 x 7 dot matrix	480/960/1920 12 x 40/80; 24 x 80 7.2 x 9.6 96 9 x 7 dot matrix	1920 24 x 80 12-inch diag. 64 5 x 7 dot matrix	1920 24 x 80 8 x 10 64 5 x 7 dot matrix	1920 24 x 80 8 x 10 96 5 x 7 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter  ASCII 13 std. Std. Opt.	Typewriter/data entry EBCDIC 20 std. Std.	Teletype/keypunch ASCII 8 std. Std. Opt.	Typewriter  ASCII None Std. No	Typewriter  ASCII Opt. Std. No
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  Std. No No Std., field only  No Std. No Std. Std. Std. Std., field only No No Std. —	U, D, L, R, Rt.  Std. Std. Opt. Char., field, screen  No Std. Std. Std. Opt. Std. 2 std. No Std. —	U, D, L, R, H, Rt.  Std. Opt. Opt. Line & screen  Opt. Std. Std. Opt. Std., address. only Std. Std. No Opt. Opt. Auto wraparound, dual intensity	U, D, L, R, H  Opt. No No Screen only  Std. No No Std. Std. No No Std. —	U, D, L, R, H  Opt. Std. Std. Char. & screen  Std. Std. Std. Std. Std. 2 std. Std. Std. Vector generation
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None Impact None Card reader, disk drive	None None Impact Opt. Card reader	Single drive Single spindle Impact None —	Single/dual drive None RS-232 interface None —	Single/dual drive No RS-232 interface No —
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half duplex Synchronous EBCDIC BSC 2400  Block No Opt. Std. Opt. No	Half duplex Synchronous EBCDIC BSC 600 to 4800  Block Std. No Std. No No	Half/full duplex Async./sync. opt. ASCII ASCII Up to 9600  Char./block Opt. Opt. Std. Std. Opt.	Half/full duplex Asynchronous ASCII ASCII 110 to 9600  Char. only No No Std.; also 20 ma. dc No Opt.	Half/full duplex Asynchronous ASCII ASCII 110 to 9600  Char./block No No Std.; 20 ma. dc No Opt.
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	Contact vendor — — — — — — 4/73 Over 30	80 to 120 — 3,200 to 4,800 121 — 7,540 2/74 Over 100	132 94 2,245 — — — 9/74 100	88 — 1,895 — — — 9/73 1,500	123 — 2,900 — — — 9/74 500
Serviced by	Sanders	Sanders	SMS	Selecterm	Selecterm
<b>COMMENTS</b>	Emulates IBM 2770. Also see Report 70D-734-01	Also see Report 70D-734-01		Mfg. by Applied Digital Data Systems as Consul 580	Mfd. by Applied Digital Data Systems as Consul 980

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	I.P. Sharp IPSA 100	I.P. Sharp IPSA 200	I.P. Sharp IPSA 300	Singer Models 80, 81, & 82	Sycor 340
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 1 Std. No Std. No No No No	Stand-alone 1 No No Std. No No No No	Cluster 8/16 No No Std., minicomputer Std. Opt. Opt.	Stand-alone 1 No No 80, 82; Singler S/10 No No No	Stand-alone 1 No Std. Opt. Opt. No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	256/512 8/16 x 32 Variable 89 APL 5 x 7 dot matrix	960 15 x 64 Variable 93 5 x 7 dot matrix	1920 24 x 80 9 to 15 in. diag. 96 ASCII/89 APL 5 x 7 dot matrix	1600 (80); 960/ 1920 20x80; 12/24x80 5.5 x 8 (81, 82) 64 7 x 9 dot matrix	576 9 x 64 7.75 x 5.5 62 5 x 7 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter  APL No No Std.	Typewriter  APL No No Std.	Data entry  ASCII Opt. Opt. Std.	Typewriter  ASCII Up to 11 Std., 80; opt. 81/82 Std., 81, 82	Typewriter  ASCII/EBCDIC No Std. No
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	None  Std. No No Screen only  Std., up only No No No No No No No No No None	None  Std. No No Screen only  Std., up only No No Opt. Opt. Opt. No No Opt. Opt. None	U, D, L, R, H, Rt.  Opt. Std. Opt. Line & screen  Opt. Opt. Opt. Opt. Opt. Char. only No Opt. Opt. —	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std., up only Std. Std. Std. Std. No No No Std. Paging, scrolling	U, D, L, R, H, Rt.  Std. No No Std.  Opt., up only Std. Std. Std. No No No No Std. None
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None None None None	None None None None None	Opt. Opt. Opt. Opt. Card reader, disk drive	No No Impact None None	Single/dual drive Dual spindle Impact None Card reader, 7-/9- tk. mag. tape units
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half duplex Asynchronous IBM Corresp. IBM 2741 134.5  Char. only No No Std. Std. Std.	Half duplex Asynchronous IBM Corresp. IBM 2741 134.5  Char. only No No Std. Std. No	Half/full duplex Async./sync. ASCII ASCII 300 to 2400  Char. only Std. Opt. Opt. No No	Half/full duplex Async./sync. ASCII Any Up to 9600  Char./block Opt. Opt. Std., 81 only Opt. No	Half duplex Async./sync. ASCII/EBCDIC ASCII/BSC 75 to 4800  Char./block No Opt. Opt. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 4-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	— — 1,800 to 2,200 — — — 4/73 Over 100	— — 2,500 to 2,900 — — — 9/75 —	— — Contact vendor — — — 7/74 —	139 to 289 — 4,000 to 9,000 — — — 6/72 (80); 9/74 4,000	150 to 593 123 to 536 6,600 to 23,720 — — — 2/71 Over 20,000
Serviced by	Sorbus	Sorbus	Sorbus	Singer	Sycor & Sorbus
<b>COMMENTS</b>	Portable controller with keyboard uses video monitor; replaces the IBM 2741			Models 81 & 82 are microprocessor- based with a vendor-program- mable ROM. Up to 63 Model 81's can be chained on one modem	Also see Report 70D-792-01



## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Sycor 255	Sycor 257	SYS Computer 500 PE/WP	TEC, Inc. Models 410/415 & 420/425	TEC, Inc. Model 440
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 1 No Std. No No No Std.	Cluster 32 No Std. No No No Std.	Stand-alone 1 No No No Std. No No	Stand-alone 1 No No Parallel (TTL) No No No	Stand-alone 1 No No RS-232 interface Std. No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	480/1920 12 x 40; 24 x 80 4.5 x 8.2; 5.8 x 8.5 64; 96 opt. 9 x 7 dot matrix	480/1920 12 x 40; 24 x 80 4.5 x 8.2; 5.8 x 8.5 64; 96 opt. 9 x 7 dot matrix	— — 14 (diagonal) 128 5 x 7 dot matrix	1000/1920 20 x 50; 24 x 80 74 sq. inches 67 5 x 7 dot matrix	1920 24 x 80 74 sq. inches 64 5 x 7 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter/data entry ASCII/EBCDIC 12 opt. Opt. Std.	Typewriter/data entry ASCII/EBCDIC 12 opt. Opt. Std.	Typewriter  ASCII 15 std. None Std.	Teletype  ASCII 2 std. Opt. Std.	Teletype  ASCII None None Std.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness level Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  Std. Std. No Char., field, screen  No Std. Std. Std. Std. Partial Std., field only 3 std. No Std. None	U, D, L, R, H, Rt.  Std. Std. No Char., field, screen  No Std. Std. Std. Partial Std., field only 3 std. No Std. None	U, D, L, R, H, Rt.  Std. Std. No Char., line, screen  Std.; up & down No Std. Std. Std. Std. No Std. Std. Underscore std.	U, D, L, R, H, Rt.  Std. Std. Std. Line, screen  Std. Std. Std. Std. Std. Std. No Std. —	Rt., LF, BS  Std. No No Char., line, screen  Std. No No No Std. No No Std. —
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None Dual spindle Impact Opt. ID card reader	None Dual spindle Impact Opt. ID card reader	None Dual spindle Impact None ID card reader	None None RS-232 interface None None	None None RS-232 interface None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half duplex Synchronous ASCII/EBCDIC BSC 1200 to 4800  Block Std. No Std. No No	Half duplex Synchronous ASCII/EBCDIC BSC 1200 to 4800  Block Std. No Std. No No	Half duplex Synchronous ASCII ASCII Up to 9600  Char./block opt. Opt. No Std. No	Half/full duplex Asynchronous ASCII ASCII 110 to 9600  Block Std. No Std., 420/425 No No	Half/full duplex Asynchronous ASCII ASCII 110 to 9600  Char. only No No No No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	98 to 110 93 to 104 4,310 to 4,840 — — — 10/73 2,000	76 to 96 72 to 91 3,340 to 4,220 80 to 96 76 to 91 2,290 to 3,790 10/73 2,000	— — 7,500 (basic) — — — — —	— — 2,450 to 3,100 — — — 2/70 1,785	— — 1,920 — — — 1/72 960
Serviced by	Sycor & Sorbus	Sycor & Sorbus	—	TEC	TEC
<b>COMMENTS</b>	Also see Report 70D-792-02	Also see Report 70D-792-02	Designed for text editing (word processing) appli- cations	Models 410/415 have parallel (TTL logic) interface; 420/425 have serial interface; rack- mounted units available	



## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	TEC, Inc. Models 450/455 & 460/465	TEC, Inc. Models 1400, 1440, & 2400	TEC, Inc. Model 4400	Tektronix Model 4023	Teleram Communications P-1800
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 1 No No No 450/455 only No No	Stand-alone 1 No No RS-232 interface Std. No No	Stand-alone 1 No Opt. No Std. No No	Stand-alone 1 No No RS-232 interface Std. No No	Stand-alone 1 Std.; 23 lbs. No No Std. No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	1000/1920 20x50; 24x80 — 67 5 x 7 dot matrix	960(1400) 1920 12/24 x 80 54/74 sq. inches 64 5 x 7 dot matrix	2000 25 x 80 — 128 5 x 7 dot matrix	1920 24 x 80 5.5 x 9 94 5 x 7 dot matrix	616 14 x 44 4.5 x 5.5 127 7 x 9 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	TTY/typewriter  ASCII None Std.; opt., 450/455 Std.	Teletype  ASCII None Opt. Std.	Typewriter  ASCII None Std. Std.	Typewriter  ASCII Std. Std. Std.	Typewriter  ASCII Std. Std. None
<b>FEATURES</b> Cursor positioning: Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  Std. Std. Std. Line, screen  Std. Std. Std. Std. Std. Std. Std. No No Std.	U, D, L, R, H, Rt.; Rt., LF, BS (1440) Std. No No Screen only  Std. Std., 1400 & 2400 Std., 1400 & 2400 Std., 1400 & 2400 Std., 1400 & 2400 Std. Std., 1400 & 2400 2 std., 1400&2400 No No Std.	U, D, L, R, H, Rt.  Std. Std. Std. Line, screen  Std. Std. Std. Std. Std. Std. 2 std. Std. Std. Scrolling	U, D, L, R, H, Rt.  Std. Std. Std. Line, field, screen  No Std. Std. Std., address. only Std. Std. No No Std.	U, D, L, R, H  No Std. Std. Std.  Std. No Std. Std. No No No No 2048-char. memory, delete word
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None RS-232 interface None None	RS-232 interface None RS-232 interface None	RS-232 interface RS-232 interface RS-232 interface None	None None Video prnt., T-4623 None None	Single drive None None None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Asynchronous ASCII ASCII/Burroughs 110 to 9600  Char./block Std., 460/465 No Std. No No	Half/full duplex Asynchronous ASCII ASCII 110 to 9600  Char./block No No Std.; opt., 1440 No Opt., 1440 only	Half/full duplex Async./sync. ASCII ASCII 110 to 9600  Char./block Std. No Std. No No	Half/full duplex Asynchronous ASCII ASCII 110 to 9600  Char./block Std. No Std. No No	Half duplex Asynchronous ASCII/TTS ASCII 110 to 1200  Block No No Std. Std. Std.
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$&mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	— — Contact vendor — — — '70; '74, 460/465 2,480	— — 1,295 to 1,995 — — — 11/74 to 4/75 1,950(1400&2400)	— — Contact vendor — — — 6/75 —	140 — 3,495 — — — 7/73 —	— — 4,825 — — — 10/74 Over 20
Serviced by	TEC	TEC	TEC	Tektronix	Teleram
<b>COMMENTS</b>	Rack mount available		Up to 28K bytes of memory; rack mount available	Switch-selectable speeds	



## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Trivex 40/80	Trivex Plus 70	Univac Uniscope 100	Univac Uniscope 200	Video Data Systems 100 Series
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Either 32 No No Std. No Std. No	Either 32 No No Std. No No Std.	Stand-alone 1 or 31 via 2 mux's. No No No No No No	Stand-alone 1 or 31 via 2 mux's. No No No No No No	Stand-alone 32 Opt. No No Std. No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	240/480/960 6/12x40; 12x80 6 x 9 64 5 x 7 dot matrix	1920 24 x 80 8 x 11 64 7 x 9 dot matrix	960/1024 12x80; 16x64 5 x 10 64; 96 opt. Stroke	1536/1920 24 x 64/80 7 x 10 64; 96 opt. 7 x 9 dot matrix	256 to 1920 8x32 to 24x80 Variable 64 7 x 8; 10 x 14 dot
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter/data entry ASCII None Std. Std.	Typewriter/data entry/console EBCDIC 12 opt. Opt. Std.	Typewriter  ASCII 4 std. Opt. No	Typewriter  ASCII 4 std. Opt. No	Typewriter  ASCII 5 opt. None Std.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  Opt. Std. Std. Std.  No Std. No Std. Std. Std. No No No No No None	U, D, L, R, Rt.  Opt. Std. Std. Char., field, line, screen Opt. Std. Std. Std. Std. Std. No 2 std. No Opt. None	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std., up & down Std. Std. Std. Std. Std. Std. No No Std. None	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std., up & down Std. Std. Std. Std. Std. Std. No No Std. None	U, D, L, R, H, Rt.  Opt. No No Screen only  Opt., up only No No No Std. Std. Char. opt. No Opt. No —
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None Impact None None	None None Impact Opt. ID card reader	Dual drive No Impact/non-impact None None	Dual drive No Impact/non-impact None None	RS-232 interface None None None ID card reader
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half duplex Async./sync. ASCII ASCII Up to 9600  Block Std. No Std. No No No	Half duplex Asynchronous EBCDIC BSC Up to 9600  Block Std. No Std. No No No	Half duplex Async./sync. ASCII ASCII (Univac) Up to 9600  Block Std. Std. Std. No No No	Half duplex Async./sync. ASCII ASCII (Univac) Up to 9600  Block Std. Std. Std. No No No	Half/full duplex — ASCII ASCII 110 to 9600  Char./block No Opt. Std. Opt. Opt.
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date  Serviced by	88 (basic) 79 (basic) 2,300 (basic) 375 (basic) 332 (basic) 8,900 (basic) 4/71 3,000  Trivex	Contact vendor Contact vendor Contact vendor Contact vendor Contact vendor Contact vendor 5/75 —  Trivex	133 to 175 — 4,350 to 5,696 53 to 76 (mux) — 2036 to 2849(mux) 5/70 —  UNIVAC	151 to 189 — 5,100 to 6,469 53 to 76 (mux) — 2036 to 2849(mux) 2/75 —  UNIVAC	— — — — — 495 to 1,995 3/73 100  VDS
<b>COMMENTS</b>			Two multiplexers can be cascaded to accommodate up to 31 terminals. Also see Report 70D-877-05	Two multiplexers can be cascaded to accommodate up to 31 terminals. Also see Report 70D-877-05	Controller uses video monitor for display; also avail- able in printed circuit boards

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Video Data Systems CG 1000	Wang Laboratories 2200 System	Westinghouse Models 1600 & 1600 DE	Westinghouse Model 1620	Westinghouse Model 1630
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Stand-alone 32 No No No Std. No No	Stand-alone 10 No Std. RS-232 interface Std. No No	Either 24 No No No 1600 only No No	Stand-alone 1 No No No Std. No No	Stand-alone 1 No No No Opt. Opt. Opt.
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	256/512 8/16 x 32 Variable 64 7 x 8; 10 x 14 dot	1024 16 x 64 8 x 10.5 64 5 x 7 dot matrix	1600 20 x 80 6 x 8 64; 96 opt. 5 x 7 dot matrix	1920 24 x 80 6.5 x 8.5 64; 96 opt. 5 x 7 dot matrix	1920 23/24 x 64/80 6.5 x 9 96 5 x 7 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter  ASCII 5 opt. None No	Typewriter  ASCII 32 std. Std. Std.	Typewriter/data entry ASCII 9 std., DE only Std. Opt.; std., DE	Typewriter  ASCII No Opt. Opt.	Typewriter  ASCII/EBCDIC Opt. No Std.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, REturn Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  Std. No No Screen only  No No No No Std. Std. Char. opt. No Opt. No —	U, D, L, R, H, Rt.  No Std., opt. Std. Char., line, screen  Std., up only No No Std. Std. No No No Opt. —	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std., up only Std. Std. Std., address. only Std. Std., char. only No No Std. Data validation for DE	L, R, Rt.  No No No Char., screen  Std., up only No No No Std. No Std. —	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Opt. Std. Std. Std. Std. Std. No Std. No —
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	RS-232 interface None None None ID card reader	Single/dual drive 1, 2, or 3 spindles Impact Various peripherals are available	None None Interface only None None	Interface only None Interface only None None	None None Buffered interface None Interface for card reader
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex — ASCII ASCII 300  Block No No Std. No No	Half duplex Asynchronous ASCII ASCII 110 to 1200  Char./block No Opt. Std. No No	Half/full duplex Async./sync. ASCII ASCII 110 to 9600  Char./block Opt.; std., DE Opt.; std., DE Std. No No	Half/full duplex Asynchronous ASCII ASCII 110 to 2400  Char. only No No Std. Opt. Opt.	Half/full duplex Synchronous ASCII ASCII Up to 9600  Block Std. Std. Std. No No
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	— — — — — 2,995 to 4,995 3/75	— 195 to 235 3,900 to 4,700 — 120 to 2,500 2,400 to 50,000 12/73 Over 2,000	— — 3,265; 3,400, DE — — 3,990 to 8,430 12/71; 1/75, DE —	— — 1,665 — — — 1/75 —	— — Contact vendor — — — 3rd qtr. 1975 —
Serviced by	VDS	Wang Labs.	Westinghouse	Westinghouse	Westinghouse
<b>COMMENTS</b>	Controller uses video monitor for for display	Minicomputer- based CRT unit with a host of available peripherals	Optional printer interfaces for Centronics 101A, 102A, and 306 printers; 1600 DE designed for on- line data entry	Switch-selectable data rates; single logic pc board	Microprocessor- based unit uses Intel 8080 with up to 6K PROM

## All About Alphanumeric Display Terminals

SUPPLIER AND MODEL	Witek Model 500	Wyle Series 8000 & 9000	Xerox Models BC 100 & BC 200	Zentec Model 9002
<b>ARRANGEMENT</b> Stand-alone or cluster Maximum displays/controller Portable case Programmable by user Direct connection to computer Teletype 33/35-compatible IBM 2260/2265-compatible IBM 3270-compatible	Either 32 No No No Std. No No	Either 16; 32, 9000 Std. Std., 9000 only Std., minicomputers No Std. Std., 9000 only	Either 4 Std. No Std., Xerox CPU's Std. No No	Stand-alone 1 No Std. RS-232 Opt., no cost No No
<b>DISPLAY ORGANIZATION</b> Display positions, chars/display Display arrangement, lines x chars/line Display area, height x width, inches Displayable symbols Symbol formation	1998 27 x 74 12 (diagonal) 64 5 x 7 dot matrix	480/960/1920 12 x 40/80; 24 x 80 7 x 9 64 5 x 7 dot matrix	960/1600 24 x 40; 20 x 80 12 to 17 (diagonal) 155 5 x 8 dot matrix	2000 25 x 80 8 x 11 128 7 x 9 dot matrix
<b>KEYBOARD</b> Style  Character set Program function keys Numeric keypad Detachable keyboard	Typewriter/data entry  ASCII None Std. Std.	Typewriter/data entry  ASCII 12 std., 9000 only Opt. Std., 9000 only	Typewriter  ASCII Std. Opt. Std.	Typewriter  ASCII 5 std., plus 10 opt. Std. Std.
<b>FEATURES</b> Cursor positioning; Up, Down, Left, Right, Home, Return Cursor blinking Character insert and delete Line insert and delete Erase  Roll Protected format Partial screen transmit Tabulation Addressable/readable cursor Character repeat Character or field blinking Programmable brightness levels Reverse video Audible alarm Other capabilities	U, D, L, R, H, Rt.  No Std. Std. Std.  No Std. Std. Std. Std., address. only Std. No 2 std. No Std. None	U, D, L, R, H  Opt., std., 9000 Std. Std., 9000 only Char., line, screen  Opt. 9000 only Std. Std. Std. Std. Std. Opt., 9000 only 2 std., 9000 only Opt., 9000 only Opt., 9000 only —	U, D, L, R, H  Std. Std. Std. Char., line, screen  No Std. Std. Std. Std., address. only Std. Std. Std. No Std. Opt. 8-color display, point plotting	U, D, L, R, H, Rt.  Std. Std. Std. Char., line, screen  Std., up or down Std. Std. Std. Std. Std. 2 std. Std. Std. Paging and scrolling, data block transfer
<b>AUXILIARY DEVICES</b> Cassette drive Diskette drive Printer Light pen Other devices	None None Impact None ID card reader	Opt., 9000 only Opt., 9000 only Impact None —	None None Opt. None None	Opt. interface Opt. interface Impact or interface None None
<b>TRANSMISSION</b> Mode Technique Code Communications discipline Speed, bits/second  Message format Polling/addressing capability Automatic answer EIA RS-232C interface Integral modem Acoustic/inductive telephone coupler	Half/full duplex Async./sync. ASCII ASCII/BSC 1200 to 2400  Char./block Std. Std. Std. Std. No	Half/full duplex Async./sync. ASCII/EBDCIC ASCII/BSC 1200 to 9600  Block Std. Opt., 9000 only Std. No No	Half/full duplex Async./sync. ASCII ASCII/BSC 300 to 9600  Char./block Std. No Std. Opt. Opt.	Half/full duplex Async./sync. opt. ASCII; others opt. ASCII/SDLC planned 110 to 9600  Char./block Opt. No Std. No Opt.
<b>PRICING AND AVAILABILITY</b> Display unit, 1-year lease, \$/mo. Display unit, 2-year lease, \$/mo. Display unit, purchase price, \$ Controller, 1-year lease, \$/mo. Controller, 2-year lease, \$/mo. Controller, purchase price, \$ Date of first production delivery Number of displays installed to date	— — 12,100 — — — — —	Contact vendor Contact vendor Contact vendor Contact vendor Contact vendor Contact vendor 1972; 1975 (9000) —	35 to 225 28 to 115 (4-yr.) 3,800 195 to 235 163 to 196 (4-yr.) 6,500 1970/1971 Over 300	— — 3,485 to 6,400 — — — 7/74 Over 200
Serviced by	Witek	Wyle or third party	Xerox	Zentec & third party
<b>COMMENTS</b>	Includes two 50K-char. magnetic tape buffers. Also see Report 70D-918-01	Discounts available based on lease term & number of units per system; 9000 is micro-programmable	Model BC 100 has smaller screen capacity. Leased units are available only with the Xerox computers	Microprocessor-based unit with up to 16K bytes of memory consisting of ROM, PROM, and RAM



## All About Teleprinter Terminals

Interactive terminals are vital links that convey conversational information between users and computers. Their effectiveness in a data communications environment is determined by the degree of satisfaction that they provide for specific user applications and their overall operating efficiency, compatibility, and flexibility within the network.

The interactive terminal market consists of scores of vendors, and the potential user is faced with a plethora of models that offer a bewildering array of capabilities and features. Interactive terminals fall into two major categories: those that display data (alphanumeric display terminals) and those that print data (teleprinters). Unit cost and user budget are typically the dominating influences that determine the type of interactive terminal selected for a specific installation—teleprinter or display terminal.

Teleprinters have traditionally been used as interactive terminals because they were the only type available before the CRT era and because their costs (particularly those of the ubiquitous Teletype units) were substantially below those of the early display terminals. But dramatic technological changes during recent years, such as the advent of large-scale integrated circuitry, have resulted in plunging equipment costs. Many vendors are now offering alphanumeric display terminals at costs substantially below those of the average teleprinter terminal. This downward trend began several years ago when Hazeltine offered its 2000 Display Terminal for purchase at less than \$3,000 or for lease at less than \$90 per month. Hazeltine recently introduced an alphanumeric display terminal with large screen and full editing capability at the shockingly low price of \$1,420. Although innovative changes in printer technology over the last few years have cut printer costs as well, these price reductions have been less dramatic. As a result, the cost of a teleprinter terminal now typically exceeds that of its electronic contemporary, the display terminal.

Now that the pricing pendulum is beginning to swing in favor of display terminals, the selection criteria for choosing the type of interactive terminal should be application-based. Users who do not really need hard-copy output should consider the numerous advantages of display terminals, while users whose operations are geared to printed copy must favor printer terminals. Some users may need printed copy only occasionally, and may find a display terminal equipped with a local copy printer to be the most effective solution.

The scope of this report includes only the *teleprinter* segment of the interactive terminal market. Alphanumeric display terminals are similarly covered in DATAPRO 70 Report 70D-010-20. Datapro defines a teleprinter terminal as *any device that combines a serial printer with*

**This comprehensive report provides detailed specifications of 149 teleprinter-style communications terminals from 57 vendors, presents the results of an extensive user survey covering more than 11,000 installed terminals, and provides guidance in selecting the most suitable terminals for your needs.**

*a data communications interface.* Although a keyboard is an important component of most teleprinters, its presence is not required for the inclusion of a product in this report. Some suppliers offer receive-only (RO) terminals composed of a printer without keyboard and a standard or optional communications interface, while others offer only printers for use by other vendors as integral parts of the data terminals they produce. For the sake of completeness, we've included all of these terminal components within the general classification of teleprinters, and they are therefore covered in this report.

This comprehensive report on the teleprinter market, currently served by more than 50 vendors, provides an 



GE's latest teleprinter, the TermiNet 30, is available in RO, KSR, and ASR configurations and can be equipped with either cassette tape recorders (shown here) or 8-level punched tape units. Unlike GE's TermiNet 300 and 1200 models, which print full characters, the TermiNet 30 employs a matrix printer that helps to account for its lower price tag.



## All About Teleprinter Terminals



*The Centronics Model 330 teleprinter, introduced in September 1975, is a lower-priced version of the company's Model 308. Centronics is the industry's leading vendor of serial impact matrix printers and offers a proliferating family of models with a wide range of operating parameters and prices.*

▷ incisive, succinct perspective of the teleprinter industry today. The report addresses the pros and cons of teleprinters versus alphanumeric display terminals, the tradeoffs between impact and non-impact printers, printer types and trends, and the makeup of the teleprinter industry and its anticipated growth over the next four years. The accompanying comparison charts present the prospective buyer with the detailed characteristics of 149 current terminal models and their prices to aid in his selection of a terminal that will satisfy his particular requirements. User experience, a vital aid to an intelligent decision, is also an integral part of this report; the experience of 571 users with more than 11,000 terminals is reported in detail.

### Teleprinter or Tube?

We've already pointed out that not all interactive applications are best served by teleprinter terminals. Many can be best satisfied by CRT display terminals, and the average unit cost of the tubes is falling rapidly as a result of large-scale integration and high-volume production techniques. In some cases, the choice of a teleprinter terminal is unwisely based on an unrelenting obsession with printed matter. Key factors to consider before choosing a teleprinter terminal over a CRT display terminal are:

- **Reliability**—CRT terminals are generally more reliable because of their total electronic operation as compared

with the inherently lower reliability of electro-mechanical devices.

- **Editing and formatting**—CRT terminals provide far greater flexibility in editing and formatting than do teleprinter terminals, although a few of the latter approach the CRT terminals' flexibility through the use of cassette recorders.
- **Operating speeds**—CRT terminals are far faster in operation than teleprinter terminals. Typical CRT output speeds range from 300 to 1200 characters per second as compared with 10 to 30 characters per second for most teleprinter terminals.
- **Output medium**—CRT terminals do not use paper or inking devices, thereby eliminating additional and continued operating costs for these supplies.

A host of additional capabilities of the current breed of display terminals provides operating flexibility not available with teleprinter terminals. And for those occasionally required printed copies, most CRT terminals are available with a serial printer or an interface for a customer-provided printer. Report 70D-010-20 presents a detailed discussion and survey of the current alphanumeric display terminals.

It may appear that the deck is heavily stacked in favor of display terminals. But here's the other side of the story: If your applications are characterized by a constant or frequent need for printed output as well as interactive input, then it's pretty clear that a teleprinter terminal is the right way to go.

### Industry Profile

The interactive terminal market is the fastest growing segment of the computer industry. The total number of interactive terminals in use skyrocketed from a mere 50,000 in 1965 to an estimated 800,000 by the end of 1974—a 16-fold growth factor in one decade. Teleprinter terminals represented about half of the installed base of interactive terminals in 1975. Projections for 1985 forecast close to 5 million interactive terminals in use, of which teleprinter terminals should account for about 40 percent, or 2 million units. This represents a five-fold increase in installed teleprinters over the next decade.

An estimated 80,000 teleprinter terminals will be shipped in 1976, as compared with an estimated 115,000 alphanumeric display terminals. Projections for 1984 show over 100,000 teleprinters shipped, compared with twice that number of display terminals. One can see from these estimates that although the teleprinter market will experience steady growth, there will be an increasing user trend toward the selection of display terminals.

The current parity between the installed base of teleprinters and that of display terminals largely reflects the edge that teleprinters enjoyed during the first decade ▷

## All About Teleprinter Terminals

of terminal use. For many years they were the only available type of interactive terminals, and when display terminals did become available, the teleprinter was still the least expensive choice. And besides, we *are* a paper-oriented society. The migration toward paperless (display) terminals is and will continue to be dictated largely by declining costs. Technological breakthroughs in the semiconductor industry during the last five years have had a profound impact on the electronics industry and on all computer users, as evidenced by the plunging prices on alphanumeric display terminals. This trend is largely responsible for the bullish projections of display terminal shipments over the next decade.

Leading the teleprinter terminal market by a wide margin is Teletype Corporation, an AT&T subsidiary with more than 750,000 units installed to date. The massive clout that Teletype wields in this market was manifested in December 1974 when Teletype announced the production of its 500,000th Model 32/33 terminal, which it gold-plated to commemorate the event.

Teleprinter terminals, and particularly the teletypewriters produced by Teletype Corporation, have been in greatest demand as low-cost terminals for general-purpose interactive applications such as those served by the computer time-sharing services. The most widely used of these terminals is the Teletype Model 33 KSR, which is available from Teletype at a purchase price below \$1,000 and from leasing companies for as little as \$44 per month. Such a price is tough to beat, and, until quite recently, has kept the more sophisticated forms of interactive terminals from seriously impacting the market.

IBM's SDLC data communications discipline was introduced as an integral component of its "Advanced Function for Communications" in September 1974. The impact of SDLC on the communications environment is not seen as appreciable in the immediate future, although it is likely that it will eventually become a de facto standard for most future terminals.

Many vendors are incorporating microprocessors into their terminals to provide more flexible terminal control. This move is primarily advantageous to the vendor, as it reduces production costs and eases the implementation of new features as they are needed or the provision of different features in different models of a product line. To the user, microprocessor control is transparent and in most cases offers no advantages over hard-wired construction unless the vendor provides some degree of programmability, which in the case of teleprinter terminals may be limited to parameter-driven programs for formatted output.

Of special interest is the IBM 3767 Communication Terminal, which was introduced in 1974 along with the company's Advanced Function for Communications announcement. The 3767 is specifically designed to communicate with virtual-mode System/370 computers by means of IBM's new SDLC communications discipline,

but the terminal can also be equipped to utilize asynchronous communications procedures in order to facilitate conversion from the earlier IBM 2740 or 2741. Though it is not user-programmable, the 3767's LSI control logic provides a high level of flexibility through the inclusion of editing, calculation, security, and diagnostic functions.

### Teletype—the Industry Giant

Teletype Corporation is unquestionably the leading manufacturer in the teleprinter terminal industry. Its broad family of teleprinters dominates the terminal market and forms the primary de facto standard which most other terminal manufactures emulate.

Teletype holds a unique position in the market that sets it apart from all the other terminal manufactures. It is a subsidiary of AT&T and as such enjoys the advantages of a huge built-in market. Teletype equipment produced for AT&T's Bell System is available from Bell only as part of specific communications services. Teletype equipment is also available directly from Teletype Corporation, but on a purchase-only basis.

Because of its unusual market position, Teletype is forced to operate under several constraints. The two major agreements that dictate Teletype's market approach are a 1956 antitrust consent decree signed by AT&T and a 1971 agreement with Western Union upon the sale of the TWX network from AT&T to Western Union. The antitrust decree prevents AT&T from marketing anything that it does not use in its own communications network; therefore, Teletype cannot market a product until AT&T offers the product through one of its own services. The agreement with Western Union prevents AT&T from offering low-speed teleprinters under its Dataphone services until April 1976. The May 1973 introduction of the Teletype Model 40 system, an impressive medium-speed CRT display terminal, turned out to be the ace up Teletype's sleeve (see Report 70D-830-06).

### Leasing Companies

Teleprinter terminals, particularly those produced by Teletype Corporation, are available from sources other than the manufacturers. These additional suppliers are third-party leasing companies that purchase OEM quantities of the terminals from the manufacturer and lease the terminals to users. Service and installation are usually provided by the leasing firm. Teletype Corporation provides classroom instruction on the servicing of its equipment for the benefit of leasing firms that market its terminals.

The more prominent leasing firms include RCA Service Company, a division of RCA, and Western Union Data Services, a division of Western Union. The products leased by these and other firms are included in the Datapro comparison charts of teleprinter terminals. ➤

## All About Teleprinter Terminals

### TYPICAL CHARACTERISTICS OF IMPACT VERSUS NON-IMPACT PRINTING TECHNIQUES

Print Characteristic	Impact Printing	Non-Impact Printing
Operation	Noisy	Silent
Speed	Usually slow	Potentially fast
Print quality	High to medium	Medium to low
Printed copies	Multiple	Single
Paper type	Ordinary	Typically special
Reliability	Low to medium	Potentially high
Cost	High to medium	Medium to low
Physical size	Medium to large	Small (potentially portable)

➤ Both RCA and Western Union provide nationwide service, which includes installation. Prime-shift service is included in the lease price of the terminals. Additional maintenance coverage is available at extra cost. Cancellation of the leases is generally permitted on 30 days' notice.

#### Serial Printers

The majority of today's teleprinter terminals employ serial printers, so named because they print one character at a time. Serial printers are grouped into two broad categories: those that mechanically strike or "impact" the paper to produce a printed image, and those that produce a printed image by some other means. Based on this key distinction, printers are generally classed as either *impact* or *non-impact* printers. The salient characteristics of both printing techniques are compared in the table.

Both basic printing techniques can be further divided into two subcategories: those that produce a "full-character" (typewriter-like) image, and those that produce a character image formed by a matrix of dots. Of the two printing techniques, full-character printing is the more favorable form because of its high legibility and appealing appearance. But full-character serial printing generally does not lend itself well to printing speeds above 30 to 35 characters per second. This restriction results from the complex mechanical arrangement required to select the character, position the print mechanism, and strike the printed image.

#### Impact Printing

The speed limitation on full-character impact printers served as the impetus for printer manufacturers to seek a different approach that would extend the upper limit of printing speed for serial impact printers. Their effort led to the development of the matrix printer, a compromise (though it has been a successful one) between decreased character legibility and substantially higher print speeds that permits serial print rates well beyond 100 characters per second.

The matrix type of impact printer produces a printed image formed by a rectangular matrix of dots, typically 7

dots high by 5 dots wide. Printing is performed by moving a print head containing a column of 7 pins across the paper and selectively actuating the pins at 5 successful intervals to form each character. Centronics, a leading OEM manufacturer of serial impact printers that employ the matrix printing technique, has attained a speed of 660 characters per second with its Model 104. The 104 uses four print heads that move bi-directionally along the same axis and in unison, so that each print head travels across just one quarter of the paper width. Though they contain comparatively few moving parts, matrix printers are subject to an increased amount of wear within the print head as a result of the succession of pin movements required to create each character.

The apparent speed limitation for full-character serial impact printers has been shattered by at least one manufacturer, Printer Technology, which produces the Printec 100, a full-character unit rated at 100 characters per second. Printer Technology approached the problem with a multiple-actuator printing technique that is really a cross between line and serial printer technology. This "print-on-the-fly" technique uses a set of six actuators, a type wheel, and a throw-away ink roller. The type wheel contains three contiguous sets of print symbols; each set is arranged in a helix (or spiral) and is serviced by two actuators so that each actuator services one half of the character set. The spinning type wheel travels on a horizontal axis across the paper in unison with the six actuators moving behind the paper.

General Electric is another company that has developed a high-speed, full-character impact printer for use in typewriter-style terminals. GE's TerminiNet 1200, a high-speed version of the successful TerminiNet 300 terminal, employs a line printing approach to produce *printed copy* at speeds up to 120 characters per second. The TerminiNet's printing arrangement consists of a type belt containing two symbol sets that moves horizontally in front of a row of print actuators. This "chain printer" technique has also been adopted by Teletype Corporation in its Model 40 printer, rated at 296 to 416 characters per second.

Numerous teleprinter terminals are currently available that feature full-character impact printing and range in speed from 10 to 30 characters per second. Among the ➤

## All About Teleprinter Terminals

more popular terminals in this class are the IBM 2740 and 2741, which contain a version of the ubiquitous IBM Selectric typewriter, the GE TerminiNet 1200, the Teletype family of typewriters, and the UNIVAC DCT 500, to name a few. Each of these terminals employs a different printing technique. IBM uses a replaceable "golf ball" print element that permits the operator to change type styles rapidly by snapping out the existing element and snapping a new one into its place. General Electric employs a moving type belt and a row of actuators, one per print position. Teletype, in its Models 33 and 38, uses a rotating cylinder that contains the type face and, in principle, operates much the same as the IBM Selectric typewriter. In its Models 35 and 37, Teletype uses a type block with type pallets embedded in the block; a single actuator is used. Univac uses a helical print wheel and throw-away cartridge ink roller, a simplified version of the technique employed by Printer Technology.

The Diablo Hy-Type, Qume Sprint, and Interdata Carousel impact printers, because of their novel approach, represent a significant contribution to the serial printer industry and a challenge to the IBM Selectric printer. With less than 12 moving parts, these printers (equipped with stepping motors) are rated at 2 to 3½ times the print speed of an IBM Selectric. Printing can be performed in either direction and paper fed either up or down. Character and line spacings are variable, with up to 120 increments per inch horizontally and up to 48 vertically to permit proportional letter spacing or incremental plotting. The print element used by the Diablo and Qume printers is a flat disk with petal-like projections called a "daisy," while that of the Interdata printer (introduced in January 1975) is shaped like a cup with finger-like projections. At the end of each projection is an embossed character.

The Diablo, Qume, and Interdata printers offer good-quality printing at a low noise level, easily changeable type fonts, and higher speeds than most other serial printers. It's apparent that these units will become familiar items in the serial printer market. Many terminal vendors have included these printer mechanisms in their products, as noted in the accompanying comparison charts.

### Non-Impact Printing

Members of the other basic class of printers—the non-impact units—employ various electronic and chemical techniques to produce printed images formed by solid lines or a matrix of dots. Some of the non-impact printing techniques have evolved from the development of facsimile communications; others were specifically developed for use in high-speed printing applications, where print speeds of better than 2000 lines per minute are not uncommon, or as low-cost alternatives to impact printing.

The electrothermal (or thermal) printing technique is the most commonly used of the non-impact techniques and is employed in the terminals produced by two leading



*The Interdata Carousel printer is similar in concept to the Diablo HyType and Qume printers in that all use a revolving, moving type element with embossed characters. The principal advantage of this approach is rapid interchangeability of type styles. The microprocessor-driven Carousel 300 is rated at 40 characters per second and features bidirectional printing, which eliminates carriage return delays.*

manufacturers of non-impact printers, NCR and Texas Instruments.

The ink-jet technique, simultaneously and independently developed by A.B. Dick and by Teletype Corporation for high-speed printing applications, sprays a stream of electrically charged ink droplets onto ordinary paper to produce printed characters. Character formation is performed by electrostatic deflection plates that control the direction of the charged ink droplets, in much the same manner as the electron beam movement is controlled within a cathode ray tube (CRT). The ink-jet technique is relatively expensive and has a limited market potential, as indicated by the small number of units delivered. Production of these units has been terminated by both A.B. Dick and Teletype. The ink-jet printing technique, however, has been simplified and employed in a printer introduced by Casio, Inc. as the Typuter.

Another familiar non-impact printing technique is the xerographic principle used in the ubiquitous Xerox copiers. Although it is a comparatively expensive technique, xerographic printing has one major advantage over most other non-impact techniques: it uses ordinary plain paper. Xerox Corporation has combined the xerographic principle with computer technology to produce a 4000-line-per-minute printer that prints on ordinary 8½ by 11 inch paper. The Xerox 1200 Computer Printing System is detailed in Report 70D-931-01. Honeywell's generally similar Page Printing System is described in Report 70D-480-10, and IBM's 3800 Page Printing System, also similar in nature to the Xerox 1200, is detailed in Report 70D-491-51.

Reliability of most non-impact printers is comparatively high because they have few mechanical parts; 3000 hours or better between failures is not uncommon.

## All About Teleprinter Terminals

## USERS' RATINGS OF TELEPRINTER TERMINALS

Terminal Supplier and Model	Number of User Replies	Number of Terminals in Use	Weighted Averages and Response Counts																													
			Overall Performance					Ease of Use					Keyboard Feel and Usability					Print Quality					Hardware Reliability					Maintenance Service				
WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P			
Anderson Jacobson—630 Series	9	83	3.3	3	6	0	0	3.2	3	5	1	0	3.1	3	5	0	1	3.1	4	2	3	0	3.6	5	4	0	3.6	7	1	0	1	
830	7	11	3.0	3	1	3	0	2.7	1	3	3	0	3.0	2	3	2	0	3.3	3	3	1	0	2.6	1	3	2	1	2.9	2	3	1	
841	17	150	3.1	4	11	2	0	3.5	10	6	1	0	3.6	10	7	0	0	3.2	4	12	1	0	2.8	3	7	7	0	3.1	7	5	4	
Subtotals	33	244	3.2	10	18	5	0	3.3	14	14	5	0	3.3	15	15	2	1	3.2	11	17	5	0	2.9	9	14	9	1	3.2	16	9	5	
Burroughs, all models	5	90	3.4	2	3	0	0	3.5	2	2	0	0	3.2	1	4	0	0	3.0	0	4	0	0	3.4	2	3	0	0	2.2	0	1	4	
Centronics, all models	4	19	3.3	1	2	0	0	3.5	1	1	0	0	—	0	0	0	0	3.3	1	2	0	0	3.3	1	2	0	0	2.3	0	1	2	
Computer Devices—1030 Series	14	54	3.2	6	5	3	0	3.4	6	8	0	0	3.3	5	8	1	0	2.7	1	8	5	0	3.1	5	6	3	0	2.2	2	3	2	
1132	5	7	3.4	2	3	0	0	3.6	3	2	0	0	3.2	2	2	1	0	2.4	1	1	2	1	3.0	2	2	0	1	2.0	1	0	1	
Subtotals	19	61	3.3	8	8	3	0	3.5	9	10	0	0	3.3	7	10	2	0	2.6	2	9	7	1	3.1	7	8	3	1	2.1	3	3	7	
Computer Transceiver Systems—Execuport 300	16	53	3.6	9	7	0	0	3.4	8	7	1	0	3.3	8	5	3	0	2.7	1	9	6	0	3.4	9	5	2	0	2.8	4	5	3	
Execuport 1200	2	2	4.0	2	0	0	0	4.0	2	0	0	0	3.5	1	1	0	0	3.5	1	1	0	0	4.0	2	0	0	0	3.5	1	1	0	
Subtotals	18	55	3.6	11	7	0	0	3.5	10	7	1	0	3.3	9	6	3	0	2.8	2	10	6	0	3.5	11	5	2	0	2.9	5	6	3	
Dataproducts Portacom	8	14	2.8	1	4	3	0	2.9	1	5	2	0	2.5	1	2	5	0	2.5	0	4	4	0	2.1	1	2	2	3	2.1	1	1	3	
Data Terminal Corp. DTC 300/S	2	34	3.5	1	1	0	0	3.0	1	0	1	0	3.5	1	1	0	0	4.0	2	0	0	0	3.5	1	1	0	0	3.0	1	0	1	
Digital Equipment—LA 30	8	28	3.3	2	6	0	0	3.3	4	2	2	0	3.3	2	6	0	0	2.8	1	5	1	1	3.3	2	6	0	0	2.7	2	3	0	
LA 36	41	255	3.6	26	11	2	0	3.6	25	14	2	0	3.4	19	19	3	0	3.4	19	19	3	0	3.4	21	14	2	1	2.9	9	18	4	
Subtotals	49	283	3.6	28	17	2	0	3.5	29	16	4	0	3.4	21	25	3	0	3.3	20	24	4	1	3.4	23	20	2	1	2.9	11	21	4	
Gen-Com GSI 300	11	31	3.5	9	0	1	1	3.4	7	2	1	1	2.9	6	0	3	2	3.4	8	1	0	2	3.4	7	2	1	1	2.2	0	5	1	
General Electric—Terminet 30	4	5	3.8	3	1	0	0	4.0	4	0	0	0	3.5	2	2	0	0	3.8	3	1	0	0	2.3	0	3	0	0	3.3	1	2	0	
Terminet 300	28	219	3.3	11	15	2	0	3.4	12	14	2	0	3.0	7	15	3	2	3.0	3	22	2	1	3.4	14	12	2	0	3.1	6	18	4	
Terminet 1200	11	16	3.4	4	6	0	0	3.4	5	4	1	0	3.0	4	4	0	2	3.4	4	6	0	0	3.3	4	5	1	0	3.4	5	4	1	
DataNet 730	2	5	2.5	0	1	1	0	2.0	0	1	0	1	1.0	0	0	0	2	2.0	0	0	2	0	3.5	1	1	0	0	3.0	1	0	1	
Subtotals	45	245	3.3	18	23	3	0	3.4	21	19	3	1	3.0	13	21	3	6	3.1	10	29	4	1	3.4	19	21	3	0	3.2	13	24	6	
GTE/Novar, all models	8	400	2.8	0	6	2	0	3.5	4	4	0	0	3.1	2	5	1	0	3.4	5	1	2	0	2.6	1	5	0	2	2.4	0	3	5	
Harris, all models	3	6	3.7	2	1	0	0	3.7	2	1	0	0	3.0	1	2	0	0	3.0	1	2	0	0	3.0	1	2	0	0	3.0	1	2	0	
IBM—1050	7	273	3.0	0	7	0	0	2.7	0	5	2	0	2.8	1	3	2	0	3.0	1	4	1	0	3.1	2	4	1	0	3.3	3	3	1	
1980	2	623	3.0	0	2	0	0	4.0	2	0	0	0	4.0	2	0	0	0	3.5	1	1	0	0	3.0	0	2	0	0	3.0	0	2	0	
2740	19	539	3.0	3	13	3	0	3.1	4	14	0	1	3.1	4	12	1	1	2.9	2	12	4	0	3.0	5	11	1	2	3.0	6	8	4	
2741	48	537	3.3	16	28	4	0	3.3	18	26	4	0	3.4	24	21	3	0	3.3	21	23	3	1	3.1	15	21	11	0	3.3	21	20	7	
3735	4	22	3.3	1	3	0	0	2.5	0	2	2	0	3.3	1	3	0	0	3.3	1	3	0	0	2.8	0	3	1	0	2.5	1	1	1	
3767	20	209	3.2	5	13	2	0	3.0	3	14	3	0	3.2	5	14	0	1	3.2	5	13	2	0	3.3	7	12	1	0	3.3	7	12	1	
CMC/ST	6	21	3.2	2	3	1	0	3.5	3	3	0	0	3.8	5	1	0	0	3.7	4	2	0	0	3.3	3	2	1	0	3.7	4	2	0	
Subtotals	106	2,224	3.2	27	69	10	0	3.2	30	64	11	1	3.3	42	54	6	2	3.2	35	58	10	1	3.1	32	55	16	2	3.2	42	48	14	

LEGEND: Weighted Average (WA) is based on assigning weights of 4 for Excellent (E), 3 for Good (G), 2 for Fair (F), and 1 for Poor (P).

➤ Silence is golden, so it has been said, and there are some quiet environments where the noise of an impact printer simply cannot be tolerated. The virtually silent non-impact printers are especially desirable in these locations.

The non-impact printers' ability to produce only one copy at a time might be a crippling disadvantage if you normally require several copies. But if you don't mind the additional time required to run off the needed extra copies on a nearby copying machine, the limitation of one copy may not be detrimental.

### User Experience

To assess the current level of user satisfaction with the installed teleprinter terminals and to determine some usage patterns, a Reader Survey Form on Teleprinter Terminals was included in the December 1975 supplement to DATAPRO 70.

By the editorial cut-off date of February 1, 1976, 571 usable responses had been received, representing user experience with a total of 11,158 terminals. This amounts to more than twice the number of installed terminals represented in Datapro's 1975 user survey. Many users reported on multiple models and/or vendors.

The ratings which the users assigned to the various models are shown in the accompanying chart. Subtotals by vendor are presented to make group comparisons easier. Weighted averages of the user ratings are also shown to simplify comparisons between models with dissimilar numbers of responses. Some of the models were rated by only a few users, and the results in these cases are presented solely for information purposes; it would be unwise to draw firm conclusions about these models from the small samples represented. For many models, however, the number of responses appears to be large enough to represent a valid cross-section of their users' experience. ➤



## All About Teleprinter Terminals

## USERS' RATINGS OF TELEPRINTER TERMINALS (Continued)

Terminal Supplier and Model	Number of User Replies	Number of Terminals in Use	Weighted Averages and Response Counts																			
			Overall Performance					Ease of Use					Keyboard Feel and Usability					Print Quality				
			WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P	WA	E	G	F	P
Memorex 1240 Series	3	84	3.0	1	1	1	0	3.7	2	1	0	0	3.0	0	2	0	0	3.3	1	2	0	0
NCR 260 Series	14	43	3.3	6	6	2	0	3.1	5	5	4	0	2.8	1	10	2	1	3.1	4	7	3	0
RCA (Teletype) 33	2	5	3.5	1	1	0	0	3.0	1	0	1	0	2.5	1	0	0	1	2.5	0	1	1	0
Singer Model 30	2	3	2.5	0	1	1	0	2.5	0	1	1	0	2.5	0	1	1	0	3.5	1	1	0	0
Teletype—																						
Model 28	19	338	3.3	5	14	0	0	2.9	0	18	1	0	2.9	1	12	3	0	3.2	4	15	0	0
Model 33 ASR	48	3,524	3.0	9	29	9	1	3.0	13	24	9	2	2.5	5	20	17	5	2.7	6	24	17	1
Model 33 KSR	20	120	2.8	3	10	7	0	2.8	3	10	6	1	1.9	0	5	7	6	2.8	3	10	6	1
Model 35 ASR	15	148	3.2	4	10	1	0	2.8	1	10	4	0	2.4	1	6	5	2	2.7	2	8	4	1
Model 35 KSR	5	51	3.2	2	2	1	0	3.2	2	2	1	0	3.0	1	3	1	0	3.0	1	3	1	0
Model 37 ASR	3	4	3.3	1	2	0	0	3.3	1	2	0	0	2.7	1	0	2	0	3.0	0	3	0	0
Model 38	5	207	3.4	2	3	0	0	3.4	2	3	0	0	3.2	2	2	1	0	3.0	1	3	1	0
Model 40	2	5	3.0	0	2	0	0	3.0	0	2	0	0	4.0	2	0	0	3.5	1	1	0	0	0
Subtotals	117	4,397	3.1	26	72	18	1	3.0	22	71	21	3	2.6	13	48	36	3	2.9	18	67	29	3
Terminal Communications—																						
TCI 71	2	551	2.5	0	1	1	0	3.0	0	2	0	0	2.5	0	1	1	0	3.0	0	2	0	0
TCI 241	4	79	3.3	1	3	0	0	3.0	1	2	1	0	3.3	2	1	1	0	3.3	1	3	0	0
Subtotals	6	630	3.0	1	4	1	0	3.0	1	4	1	0	3.0	2	2	2	0	3.2	1	5	0	0
Texas Instruments—																						
Silent 700 Series	22	89	3.4	11	8	3	0	3.4	10	11	1	0	3.3	9	9	3	1	2.6	2	9	11	0
TI 725	9	25	3.2	3	5	1	0	3.6	5	4	0	0	3.4	5	3	1	0	2.2	1	2	4	2
TI 733	14	241	3.4	5	9	0	0	3.5	7	7	0	0	3.1	4	7	3	0	2.7	3	5	5	1
TI 735	13	37	3.2	3	10	0	0	3.6	8	5	0	0	3.2	4	8	1	0	2.5	1	5	7	0
Subtotals	58	392	3.3	22	32	4	0	3.5	30	27	1	0	3.2	22	27	1	0	2.6	7	21	27	3
Trendata 4000	2	9	3.0	0	2	0	0	3.0	0	2	0	0	4.0	2	0	0	0	3.5	1	1	0	0
Univac DCT 500	12	18	2.8	1	8	3	0	2.6	2	4	1	2	2.7	3	2	6	0	2.9	2	7	3	0
Western Union (Teletype)—																						
EDT-33	7	197	2.7	1	3	3	0	3.1	2	4	1	0	3.0	1	5	1	0	2.7	1	3	3	0
EDT-300	6	68	3.3	2	4	0	0	3.2	1	5	0	0	3.2	2	3	1	0	3.2	2	3	1	0
Subtotals	13	265	3.0	3	7	3	0	3.7	3	9	1	0	3.1	3	8	2	0	2.9	3	6	4	0
Wittek, all models	2	83	3.0	0	2	0	0	3.5	1	1	0	0	3.5	1	1	0	0	3.0	1	0	1	0
Xerox 3010	2	2	4.0	2	0	0	0	3.5	1	1	0	0	4.0	2	0	0	0	4.0	2	0	0	0
All Others	19	1,440	2.9	3	12	3	1	2.9	2	13	4	0	3.0	5	9	5	0	3.1	5	10	4	0
Grand Totals	571	11,158	3.2	185	312	67	3	3.2	204	287	68	7	3.0	176	257	93	28	3.0	144	293	115	12

LEGEND: Weighted Average (WA) is based on assigning weights of 4 for Excellent (E), 3 for Good (G), 2 for Fair (F), and 1 for Poor (P).

➤ Several questions were asked to determine usage patterns. The percentage results reported below are based on the total number of responses (571).

## TELEPRINTER USAGE PATTERNS

	Number of Responses	Percent of Responses
APPLICATIONS		
Inquiry/response	209	36.6
Time-sharing	417	73.0
Text transmission	92	16.1
Data transmission	158	27.7
Document preparation	115	20.1
Other applications	50	8.6
TRANSMISSION SPEED		
10 char/sec	197	34.5
15 char/sec	142	24.9
30 char/sec	260	45.5
60 char/sec	8	1.4
120 char/sec	43	7.5
Other speeds	31	5.4

## TRANSMISSION CODE

ASCII	401	70.2
EBCDIC	92	16.1
IBM Correspondence	57	10.0
Other codes	27	4.7

## TRANSMISSION FACILITY

DDD (dialed network)	395	69.2
Leased voice-grade lines	105	18.4
Other facilities	103	18.0

## MODEM USAGE

Acoustic coupler	242	42.4
Integral with terminal	132	23.1
Bell System modems	164	28.7
Other modems	79	13.8

## AUXILIARY FEATURES

Punched tape	125	21.9
Cassette tape	55	9.6
Answerback	48	8.4
Other auxiliary features	32	5.6
None	345	60.4





## All About Teleprinter Terminals

➤ When looking at the usage figures, keep in mind that they are based on the number of responding users, not on the number of terminals. Also, some skew is introduced because not all of the users responded fully.

The majority of the respondents to this survey, as indicated by the usage table, were users of a time-sharing service. This helps to account for the heavy usage of the dial network in contrast to leased or other facilities, as well as the fact that 42.4 percent of the respondents reported the use of an acoustic telephone coupler. The trend toward higher print speeds is also apparent, with 30 characters per second being the most popular speed. Comparatively few of these users were operating at print speeds above 30 cps, even though some of the more prominent vendors, such as GE, produce faster printers. Most of the users were employing ASCII terminals, which provide the flexibility to communicate with virtually any computer. The majority of these users were not using auxiliary features such as external storage media. Among those that were, punched tape was the storage medium most frequently reported as a result of the popularity of the Teletype ASR terminals.

### Teleprinter Terminal Characteristics

The accompanying comparison charts summarize the characteristics of 149 commercially available teleprinter terminals from 57 suppliers. Nearly all of the information was received from the suppliers during the months of December 1975 and January 1976. Their cooperation is acknowledged and greatly appreciated.



*Leasing companies are becoming increasingly important sources of supply for teleprinters. This GE TerminiNet 1200 is provided by Leasco Data Communications Corporation, which also offers teleprinters from other prominent manufacturers such as DEC and Teletype Corporation.*

Datapro sent repeated requests for information to more than 60 companies known or believed to be in the teleprinter terminal business. The 57 usable responses summarized in our charts provide a comprehensive picture of the commercial terminals that are currently available in the United States and Canada. *The absence of any specific company from our charts means that the company either failed to respond to our repeated information requests or was unknown to us.*

The chart entries and their significance are explained in the following paragraphs.

### Compatibility

Most of the communications terminals currently on the market are designed as direct replacements for other popular terminals. In the teleprinter terminal market, replacement terminals generally fall into three categories: those designed to replace a Teletype Model 33 or 35 teletypewriter, those designed to replace an IBM 2740 Model 1 or Model 2 Communications Terminal, and those designed to replace an IBM 2741 Communications Terminal. Datapro included these three entries to define the category of *compatibility*.

### Model Configurations

Teleprinter terminals are typically available in any or all of three basic *model configurations*: Receive-Only (RO), which includes a *printer only*; Keyboard Send-Receive (KSR), which includes a *keyboard and printer*; and Automatic Send-Receive (ASR), which includes a *keyboard, printer, and punched tape reader and punch*.

There are three commonly used punched tape widths and four standard code levels. The tape widths are 11/16-inch, 7/8-inch, and 1-inch; the code levels are 5, 6, 7, and 8. Five-level code is associated with the narrowest of the three tape widths and is used with terminals that employ the Baudot code, such as earlier Teletype units including the Model 28. Six and seven-level codes are associated with the 7/8-inch tape width. The most common punched tape format for computer usage, however, is the eight-level code associated with one-inch tape.

In recent years, magnetic tape cassette and cartridge recorders have been replacing punched tape equipment on computer terminals as a result of increasing availability of quality components, decreasing prices, and rising popular demand for the magnetic tape cassette or cartridge recorders based on their ease of usage and operating flexibility. Hence, the entry: *Keyboard, printer, and magnetic tape recorder*.

To enhance the operating flexibility of these basic terminal configurations, some manufacturers have added *other devices* such as punched card readers, auxiliary printers, and computer-compatible magnetic tape drives. These devices may be offered as either standard or optional components of the terminals.

## All About Teleprinter Terminals

### Features

Teleprinter terminals are available with a variety of potentially useful features and capabilities. No one terminal has them all, however, and some stripped-down economy models offer very few of them.

Many of these equipment features are essentially self-explanatory. Therefore, only the teleprinter terminal features which are of general interest and which do not readily explain themselves are described in the paragraphs that follow.

The term *programmable* can be defined in several different ways. Datapro defines the term as operating under the direction of a program stored within the terminal, such as a user's application program or an emulation program that simulates the operation of a different terminal (usually one produced by another manufacturer). Most terminals included in the current generation of teleprinter terminals have not reached this level of sophistication, primarily because of the often-prohibitive cost which accompanies such a degree of sophistication.

The use of a *buffer* between the terminal and communications facility promotes communications economy through increased transmission speeds and enhances terminal flexibility through additional capabilities such as message editing prior to transmission. Buffering can be performed by input/output media such as punched or magnetic tape, and often is (e.g., in the Teletype ASR terminals). However, some manufacturers provide an *internal buffer* (usually composed of a semiconductor shift register), which is used to gather keyed or received data prior to transmitting or printing, respectively. The *internal buffer capacity* in characters is presented where applicable.

*Editing*, by line and/or character, featured only on terminals that provide some form of buffering, allows the operator to correct data that has been erroneously keyed prior to transmission. Some terminals, such as those that include a punched tape capability, provide editing by character only. Those that contain an internal buffer, however, usually permit the entire buffer to be erased so that a line containing an error at the beginning can be quickly retyped instead of having to backspace character-by-character to reach the erroneous entry. On some of the more flexible terminals, such as those that contain dual cassette recorders, the editing facilities include the ability to update an existing tape. Keyed data can be merged with data read from the existing tape to produce a new, updated tape.

*Parity checking and/or generation* are important terminal features that safeguard the integrity of transmitted data. Some terminals only perform parity checking on received data, while others only generate character parity for each transmitted character. Still others provide both checking and generation. Many terminals allow the operator to

select odd or even parity or to inhibit the parity functions.

Terminals that are designed to operate in a multistation environment (i.e., multidropped from a leased line) must include a *polling and addressing capability* so that computer messages can be directed to a specific terminal and terminal messages can be selectively transmitted to the computer; otherwise, the multidropped terminals would be required to contend with one another for the computer by "bidding" for use of the line.

The *automatic answer* feature permits the terminal to respond automatically to a call via the dial network from the remote computer. The terminal responds by readying itself to receive and print the incoming message.

### Printer Characteristics

Printer *type* and printing *technique* for serial printers have been discussed in the preceding section titled "Serial Printers." *Type* categorizes the printer as an impact or non-impact printer; *technique* specifies the printed character image as full character or dot matrix and describes the printing technique in a concise, simplified manner.

The total number of print positions in which the printer can print on each line is specified by the entry, *character positions per line*.

*Print rate* specifies the maximum rated printing speed of the printer in characters per second. Some terminals offer more than one rated printing speed to facilitate matching the communications characteristics of the remote device. In most cases, manual selection is provided to switch among the available speeds.

*Character set* specifies the total number of print symbols provided by the printer. Typically, the character set is composed of upper case alphabets, numerics, and special symbols including punctuation. *Lower case alphabets* are usually available as an option, if at all, since they are not required in many cases and tend to reduce printing speed. Where more than one character set is available, the entries distinguish between standard and optional sets.

*Horizontal pitch* defines the spacing between the centers of successive characters printed in the same line, and is presented in characters per inch. *Vertical spacing* defines the spacing between print lines, and is presented in lines per inch.

*Forms feed* specifies the type of paper-feed mechanism employed by the printer, usually as friction feed or pin feed. Some terminals are available with either type, but typically offer pin feed as an option. Some non-impact printers feed paper without the need for conventional friction or pin feed mechanisms.

*Horizontal tabulation* and *vertical formatting* facilitate control of the format of the printed output. In most ➤

## All About Teleprinter Terminals



Diablo's new 45-cps 1620 HyTerm terminal contains a HyType II printer mechanism and is microprocessor-driven. Sold OEM only by Diablo, the 1620 is available to end users through several vendors that provide lease terms.

▷ cases, this level of sophistication is not required to handle received messages, which is the prime function of a teleprinter terminal. However, some manufacturers provide the capabilities as an option.

Features other than those listed in the standard comparison chart entries, such as tractor feed or split platen, are presented as *other features*.

### Keyboard Characteristics

The style of *keyboard arrangement* defines the key/symbol relationships. There are two basic keyboard arrangements, typewriter and keypunch style. Teletype-writer keyboards, such as those provided with the Teletype terminals, can generally be categorized as typewriter arrangements. The keypunch arrangement is often referred to as a data entry keyboard. Some terminals are available with more than one keyboard style to permit the user to satisfy his particular need.

*Character set* refers to the total number of character codes and the code set that the keyboard is designed to generate. Each keytop symbol, represented by a corresponding bit pattern, is independent of its corresponding character code and can be interchanged with other symbols without affecting keyboard operation.

Keyboard *features* include such entries as numeric pad or character repeat. Some terminals offer these features as standard capabilities; others make them available as options only.

### Transmission

Each teleprinter terminal contains a communications interface that enables communications between the terminal and the central computer site. *Mode* and *technique*

define the operating mode and the method in which data is transmitted. There are three operating modes: simplex (transmission in one direction only), half-duplex (transmission in both directions, but not simultaneously), and full-duplex (simultaneous transmission in both directions).

Data is transmitted synchronously or asynchronously. Asynchronous transmission is characterized by the transmission of data in irregular spurts, where the duration of time can vary between successive transmitted characters; the transmission from an unbuffered teletypewriter is a good example. Synchronous transmission implies the transmission of data in a steady stream. Each transmitted character is clocked, and the time interval between successive characters is always precisely the same. The communications interface either provides clocking or accepts external clocking signals from the data set.

The transmission *speed* of the terminal is specified in bits per second and is usually limited by the speed of the printer or other I/O device unless the terminal contains an internal buffer. Buffered operation permits printing to be performed at the rated speed of the printer, although the transmission speed may be much greater. Most teleprinter terminals are unbuffered due to cost considerations and therefore operate at low transmission speeds.

The transmission *code* refers to the bit pattern of the transmitted characters. The ASCII code is prominent and has been accepted as an industry and government standard; it is now by far the most commonly used code. Other transmission codes popularly employed by teleprinter terminals include Correspondence (a Selectric terminal code introduced by IBM) and two paper tape transmission codes, PTTC/BCD and PTTC/EBCD. Correspondence, PTTC/BCD, and PTTC/EBCD are all 7-level codes (including character parity); ASCII is an 8-level code, which also includes character parity.

The *unit code structure* specifies the total number of bits transmitted for each character. Asynchronous operating conventions require a single start bit and one or two stop bits to be combined with the character code for each transmitted character; therefore, an 8-level code such as ASCII is transmitted as a 10- or 11-unit code. Following Teletype's lead, the 11-unit code structure has been generally adopted for transmission at 10 characters per second; 10-unit codes are typically used at higher operating speeds.

Terminals that are capable of operating at more than one transmission speed typically feature *operator selectable speeds* via switch selection.

Transmission *format* refers to the length in characters of a transmitted message. Unbuffered terminals transmit each character as it is keyed; therefore, the entry reads "character-by-character." Buffered terminals transmit data in multi-character blocks whose length is usually limited by the buffer capacity. ▷

## All About Teleprinter Terminals

The terminal's interface generally meets the standard *EIA RS-232B/C* and *CCITT* specifications and connects to a modem or acoustic telephone coupler. Teletype terminals and their independent replacements are also available with a dc current-loop interface designed for use on telegraph-grade or private-wire facilities.

Some terminals contain an *integral modem* that can be connected directly to a communications line via a Bell System Data Access Arrangement. In some cases the manufacturer also provides an acoustic and/or inductive *telephone coupler* so that the terminal can be connected to a conventional telephone handset.

### Pricing and Availability

The comparison charts show the per-terminal *one-year lease*, *two-year lease*, and *purchase prices* where applicable. Single entries generally indicate the price of the basic unit without options; price ranges show the price of the basic unit and the price of an expanded unit with all options. In some cases, the terminal supplier offers a lease term other than those shown, such as a 3- or 5-year lease or a 30- or 60-day lease. In such cases, the lease prices and terms appear under the Comments entry at the bottom of the charts.

*Date of first production delivery* indicates when the first production model of each teleprinter terminal was delivered (or is scheduled to be delivered) to a customer.

*Terminals installed to date* shows how many teleprinter terminals of each type had been delivered to customers as of January 1976. All figures were supplied by the vendors themselves, and a number of companies chose not to release this information.

*Serviced by* specifies the party responsible for maintaining the terminal. In some cases the vendor provides total service; in others, a national service organization is responsible. Service is sometimes rendered under the combined efforts of both the vendor and an independent service organization.

*Comments* at the bottom of the charts describe significant or unusual features, capabilities, or applications which are not reflected in the standard entries.

### Teleprinter Terminal Vendors

Listed below, for your convenience in obtaining additional information, are the full names and addresses of the suppliers whose products are summarized in the comparison charts.

*Acrodyne Data Devices, Inc.*, 1217 Summit Avenue, Union City, New Jersey 07087. Telephone (201) 865-3220.

*Anderson Jacobson, Inc.*, 1065 Morse Avenue, Sunnyvale, California 94086. Telephone (408) 734-4030.

*Applied Computer Systems*, 248 Sovante Way, Sunnyvale, California 94086. Telephone (408) 733-3733.

*Applied Computing Technology*, 17961 F Sky Park Circle, Irvine, California 92707. Telephone (714) 557-9972.

*Carterfone Communications Corporation*, 2639 Walnut Hill Lane, Suite 223, Dallas, Texas 75229. Telephone (214) 350-7011.

*Casio, Inc.*, Suite 4011, New York, New York 10048. Telephone (212) 432-9230.

*Centronics Data Computer Corp.*, Hudson, New Hampshire 03051. Telephone (603) 883-0111.

*ComData*, 8115 N. Monticello Avenue, Skokie, Illinois 60076. Telephone (312) 677-3900.

*Compro Corporation*, Building 6-103, 3001 Red Hill Avenue, Costa Mesa, California 92626. Telephone (714) 540-7153.

*Compunetics*, 1100 Eldo Road, Monroeville, Pennsylvania 15146. Telephone (412) 373-2520.

*Computer Devices, Inc.*, 9 Ray Avenue, Burlington, Massachusetts 01803. Telephone (617) 273-1550.

*Computer Transceiver Systems, Inc. (CTSI)*, 317 Route 17, Paramus, New Jersey 07652. Telephone (201) 261-6800.

*Control Data Corporation*, PO Box 0, Minneapolis, Minnesota 55440. Telephone (612) 853-4656.

*Data Access Systems, Inc.*, 100 Route 46, Mountain Lake, New Jersey 07046. Telephone (201) 335-3322.

*Data Input, Inc.*, 4401 W. 76th Street, Minneapolis, Minnesota 55435. Telephone (612) 831-6500.



*Gen-Com Systems offers teleprinters built around Diablo or Qume "daisy-wheel" printing mechanisms. This Model 300Q ASCII terminal is Teletype-compatible and provides a line width of 132 or 158 characters.*



## All About Teleprinter Terminals

- *Data Measurements Corp.*, 2300 Owen Street, Santa Clara, California 95051. Telephone (408) 249-1111.
- Dataproducts Corporation*, Stelma Telecommunications Division, Commerce Drive, Stamford, Connecticut 06902. Telephone (203) 325-4161.
- Data Terminals & Communications*, PO Box 5583, San Jose, California 95150. Telephone (408) 378-1112.
- Diablo Systems, Inc.*, (a Xerox Company), 24500 Industrial Boulevard, Hayward, California 94545. Telephone (415) 786-5000.
- Di/An Controls, Inc.*, 44 Dorchester Avenue, Dorchester, Massachusetts 02125. Telephone (617) 288-7700.
- *Digital Equipment Corporation*, 146 Main Street, Maynard, Massachusetts 01754. Telephone (617) 897-5111.
- Extel Corporation*, 310 Anthony Trail, Northbrook, Illinois 60062. Telephone (312) 272-8650.
- Facit-Addo Inc.*, 66 Field Point Road, Greenwich, Connecticut 06830. Telephone (203) 622-9150.
- Gen-Com Systems, Inc.*, 2306 Cotner Avenue, Los Angeles, California 90064. Telephone (213) 478-6087.
- General Electric Company*, Data Communications Division, Waynesboro, Virginia 22980. Telephone (703) 942-8161.
- Harris Communications Systems, Inc.*, 11262 Indian Trail, Dallas, Texas 75234. Telephone (214) 241-0551.
- *International Business Machines Corporation (IBM)*, Data Processing Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.
- International Business Machines Corporation (IBM)*, Office Products Division, Franklin Lakes, New Jersey 07417. Telephone (201) 848-1900.
- Inforex*, 21 North Avenue, Burlington, Massachusetts 01803. Telephone (617) 272-6470.
- Informer Computer Terminals*, 2218 Cotner Avenue, Los Angeles, California 90064. Telephone (213) 477-4216.
- Interdata*, a subsidiary of Perkin-Elmer Corporation, Terminal Products Group, Oceanport, New Jersey 07757. Telephone (201) 229-4040.
- Leasco Data Communications Corporation*, 20030 Century Boulevard, Germantown, Maryland 20767. Telephone (301) 428-0500.
- LogAbax (U.S. Division)*, 10889 Wilshire Boulevard, Los Angeles, California 90024. Telephone (213) 477-0494.
- Memorex Corporation*, Equipment Group, San Tomas at Central Expressway, Santa Clara, California 95052. Telephone (408) 987-3412.
- MI<sup>2</sup> Data Systems*, 1356 Norton Avenue, Columbus, Ohio 43212. Telephone (614) 481-8881.
- *NCR Corporation*, EDP Products, Dayton, Ohio 45409. Telephone (513) 449-2041.
- Okidata*, 111 Gaither Drive, Moorestown, New Jersey 08057. Telephone (609) 235-2600.
- *Olivetti*, 500 Park Avenue, New York, New York 10022. Telephone (212) 826-1200.
- Printer Technology, Inc.*, Sixth Road, Woburn Industrial Park, Woburn, Massachusetts 01801. Telephone (617) 935-4246.
- Qualterm Terminals*, Division of Data Equipment, Inc., 2005 O'Toole Avenue, San Jose, California 95131. Telephone (408) 263-7800.
- Qume*, 2323 Industrial Parkway Left, Hayward, California 94545. Telephone (415) 783-6100.
- *Randal Data Systems* 2807-F Oregon Court, Torrance, California 90503. Telephone (213) 320-8550.
- RCA Service Company*, Division of RCA Corporation, Camden, New Jersey 08101. Telephone (609) 779-4129.
- Redactron Corporation*, 100 Parkway Drive South, Hauppauge, New York 11787. Telephone (516) 543-8700.
- SCM/Kleinschmidt*, Division of SCM Corporation, Lake Cook Road, Deerfield, Illinois 60015. Telephone (312) 945-1000.
- Scope Data Inc.*, 3728 Silver Star Road, Orlando, Florida 32808. Telephone (305) 298-0500.
- Selecterm, Inc.*, 2 Audobon Road, Wakefield, Massachusetts 02143. Telephone (617) 623-7800.
- The Singer Company*, International Teleprinter Division, 493 Washington Avenue, Carlstadt, New Jersey 07072. Telephone (201) 785-4450.
- *Teletype Corporation*, 5555 Touhy Avenue, Skokie, Illinois 60076. Telephone (312) 982-2000.
- Terminal Communications*, PO Box 27228, Raleigh, North Carolina 27611. Telephone (919) 834-5251.
- Texas Instruments*, 12202 Southwest Freeway, Stafford, Texas 77477. Telephone (713) 494-5115.
- Trans-Lux Corporation*, 625 Madison Avenue, New York, New York 10022. Telephone (212) PL 1-3110.
- Trendata Computer Systems*, 610 Palomar Avenue, Sunnyvale, California 94086. Telephone (408) 732-1790.
- Tycom Systems Corporation*, 26 Just Road, Fairfield, New Jersey 07006. Telephone (201) 227-4141.
- *UNIVAC Division*, Sperry Rand Corporation, P.O. Box 500, Blue Bell, Pennsylvania 19422. Telephone (215) 542-4011.
- Victor Comptometer*, 3900 N. Rockwell Street, Chicago, Illinois 60618. Telephone (312) 539-8200.
- Western Union Data Services Company*, 70 McKee Drive, Mahwah, New Jersey 07430. Telephone (201) 529-1170.
- *Witek, Inc.*, Glover Avenue, Norwalk, Connecticut 06850. Telephone (203) 853-7400. □

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Acrodyne Teletype Model 28	Acrodyne Teletype Model 32	Acrodyne Teletype Model 33	Acrodyne Teletype Model 35	Acrodyne Teletype Model 40 ROP
<b>COMPATIBILITY</b> Teletype IBM 2740-1/2740-2 IBM 2741	No No No	No No No	Yes No No	Yes No No	No No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices  Portable	Yes Yes Yes No None No	Yes Yes Yes No None —	Yes Yes Yes No None No	Yes Yes Yes No None No	Yes Yes No Yes None No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No No — ASR only — Opt. Std.	No No — ASR only — Opt. Std.	No No — ASR only Gen. std.; chk. opt. Opt. Std.	No No — ASR only Gen. std.; chk. opt. Opt. Std.	No Opt. 1000 No Checking only Opt. Std.
<b>PRINTER CHARACTERISTICS</b> Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Impact Full char. printing via moving type box 72 10 58 Baudot No 10 4/6 Friction or pin Opt. No —	Impact Full char. printing via rotating cylinder 72 10 58 Baudot No 10 4/6 Friction or pin Opt. No —	Impact Full char. printing via rotating type cylinder 72 10 64 ASCII No 10 6/3 Friction or pin No No Prints lower-case alpha as upper- case equiv.	Impact Full char. printing via moving type box 72 10 64 ASCII No 10 6/3 Friction or pin Std. Std. Prints lower-case alpha as upper- case equiv.	Impact Full char. printing via type belt and multiple actuators 80 296-416 64/96 ASCII Opt. 10 6/3 Friction or pin No No —
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	32-key teleprinter 58 Baudot —	32-key teleprinter 58 Baudot —	53-key teleprinter 64 ASCII —	50-key teleprinter 64 ASCII —	— — —
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface  Integral modem Telephone coupler	Half/full duplex Asynchronous 70-75 5-level Baudot 7.0-7.5 No Char. by char. RS-232C or 20/60 ma. dc current  — —	Half/full duplex Asynchronous 70-75 5-level Baudot 7.0-7.5 No Char. by char. RS-232C or 20/60 ma. dc current  — —	Half/full duplex Asynchronous 110 8-level ASCII 11 bits/char. No Char. by char. RS-232C or 20/60 ma. dc current  — —	Half/full duplex Asynchronous 110 8-level ASCII 11 bits/char. No Char. by char. RS-232C or 20/60 ma. dc current  — —	Half/full duplex Asynchronous 1200 8-level ASCII 10 bits/char. No Char. by char. RS-232C  — —
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	135 (ASR) 109-115 (ASR) — 1968 1,000+ (all mdl.) Acrodyne	65 (ASR) 60 (ASR) — 1968 1,000+ (all mdl.) Acrodyne	65 (ASR) 60 (ASR) — 1968 1,000+ (all mdl.) Acrodyne	150 (ASR) 135 (ASR) — 1968 1,000+ (all mdl.) Acrodyne	— Contact vendor — 1974 — Acrodyne
<b>COMMENTS</b>	Price includes modems	Price includes modems	Price includes modems	Price includes modems	



## All About Teleprinter Terminals

SUPPLIER AND MODEL	Anderson Jacobson AJ 630	Anderson Jacobson AJ 830/832	Anderson Jacobson AJ 841	Applied Computer Systems ACS-3750	Applied Computer Systems ACS-3780
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No Opt.	No No Yes	Yes No Yes	Yes No Yes
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	Yes Yes No Yes None	No Yes No Yes None	No Yes No Yes None	Model 3713 only Yes No Opt. Diskette	Model 3713 only Yes No Opt. Diskette
Portable	Yes; 37 lbs.	No	Yes; 65 lbs.	Mobile	Mobile
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No No — No Both No No	No Yes 128/256 No Both No No	No No — No Both No No	No Std. 120; 1024 opt. No Yes No No	Yes Std. Unlimited Opt. Yes Opt. Opt.
<b>PRINTER CHARACTERISTICS</b> Type Technique	Non-impact 5 x 8 dot matrix	Impact Full character printing via print wheel	Impact Full char. printing via IBM Selectric mechanism	Impact Full char. printing via daisy wheel	Impact Full char. printing via daisy wheel
Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	140 10, 15, or 30 95 ASCII Std. 10 6 Friction Std. No None	132/156 10, 15, 30, or 45 96 ASCII Std. 10/12 6/8 Friction; pin. opt. Std. Std. Tractor feed and plotting optional	130/156 15 88 EBCD/Corr. Std. 10/12 6 Friction Std. No Tractor feed and print suppress	132/158 10, 15, or 30 128 ASCII Std. 10/12 6/8 Friction; pin opt. Std. No Reverse line feed; incremental plotting	132/158 10, 15, or 30 128 ASCII Std. 10/12 6/8 Friction; pin opt. Std. Yes Dynaplot, subscript, pagination
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	68-key typewriter 128 ASCII Character repeat, manual CR/LF, & numeric pad opt.	68-key typewriter 128 ASCII Character repeat, manual CR/LF, & numeric pad	53-key typewriter 96 EBCD/Corr. Typamatic and reverse break both standard	61-key typewriter 128 ASCII Character repeat, numeric pad opt.	61-key typewriter 128 ASCII Character repeat, numeric pad opt.
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110, 150, or 300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C, acoustic, or DAA	Half/full duplex Asynchronous 110, 135, 150, 300 8-lvl ASCII/EBCDIC 9/10/11 bits/char. Std. Char. by char. RS-232C	Half duplex Asynchronous 135 6-level EBCD/Corr. 9 bits/char. No Char. by char. RS-232C, acoustic, or DAA	Half/full duplex Asynchronous Up to 300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C or 20/60 ma. dc current	Half/full duplex Async./sync. Up to 300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C or 20/60 ma. dc current
Integral modem Telephone coupler	Opt. Opt.	No Opt.	Opt. Opt.	Opt. Opt.	Opt. Opt.
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	115 105 (3-yr.) 3,095 November 1971 Over 3,000 Anderson Jacobson	175 158 (3-yr.) 3,700 1975 Over 1,000 Anderson Jacobson	90 76 (3-yr.) 2,995 August 1970 Over 2,500 Anderson Jacobson	175-200 185-220 2,800-4,000 December 1973 Over 200 ACS or third party	250-325 250-345 4,000-6,000 January 1976 — ACS or third party
<b>COMMENTS</b>	Answer-back op- tion available; APL version also avail- able; a 30-day lease is available	APL version also available; a 30-day lease is available	Special keytops available, such as APL and CALL/ 360; a 30-day lease is available	Employs Diablo HyType printer mechanism; APL available	Employs Diablo HyType printer mechanism; user- programmable; up to 64K-byte mem- ory

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Allied Computing Technology 900 Series	Carterfone 33 ASR Data Terminal	Carterfone S15 Selectric Data Terminal	Carterfone 300 Data Terminal	Carterfone LA-36 DECwriter
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No No	No No Yes	Yes No No	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	900 only 950 only No No None	No Yes Yes; 8-level No None	No Yes No No None	No Yes No No None	No Yes No Yes, 1 or 2 cas- settes None
Portable	No	Opt; 56 lbs.	Opt; 54 lbs.	No	No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No Std. 320 No Generation only Opt. Opt.	No No — No Generation opt. Opt. Opt.	No No — No Generation only No No	No No — No Gen. std.; chk. opt. Opt. Opt.	No Std. 16 No Both std. No No
<b>PRINTER CHARACTERISTICS</b> Type Technique	Impact 9 x 7 dot matrix	Impact Full char. printing via type cylinder	Impact Full char. printing via IBM Selectric mechanism	Impact Full char. printing via type belt and hammers	Impact 7 x 7 dot matrix
Character positions per line	132; 156 opt.	72	130 std.; 156 opt.	118	132
Print rate, char/second	120	10	15	10, 15, or 30	10/15/30
Character set	96 ASCII	64 ASCII	96 EBCDIC	94 ASCII	96 ASCII
Lower case alphabetic	Std.	No	Std.	Std.	Std.
Horizontal pitch, char/inch	10/12	10 std.; 12 opt.	10 std.; 12 opt.	10	10/16.5 opt.
Vertical spacing, lines/inch	6	3 or 6	6	6	6
Forms feed	Pin (tractor)	Pin feed	Frict.std.; pin opt.	Friction; pin opt.	Pin (adj. tractor)
Horizontal tabulation	Std.	Opt.	Std.	Opt.	No
Vertical formatting	Opt.	Opt.	No	Vertical tab	No
Other features	Reverse line feed; bi-directional printing	None	None	None	Tractor feed, APL set, auto line feed opt.
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	63-key typewriter 128 ASCII Numeric pad opt.	53-key teleprinter 64 ASCII Character repeat std.; numeric pad opt.	58-key typewriter 64 BCD/Corr. APL character set opt.	Typewriter 128 ASCII Character repeat; numeric pad opt.	58-key typewriter 128 ASCII Char. repeat & break std.; numeric pad opt.
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110/300/1200 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C or 20/60 ma. dc current	Half/full duplex Asynchronous 110 8-level ASCII 11 bits/char. No Char. by char. 20 or 60 ma. dc current std.; RS-232C opt.	Half duplex Asynchronous 150 BCD/Corr. 7 bits/char. No Char. by char. RS-232C	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. No Char. by char. 20 ma. dc current std.; RS-232C & CCITT opt.
Integral modem	Opt.	Opt.	No	No	No
Telephone coupler	Opt.	Opt.	Opt.	No	No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	— — 2,895-3,495 4th qtr. 1974 — ACT	See Comments See Comments NA — 6,000 Carterfone	See Comments 69 1,200 June 1971 800 Carterfone	See Comments See Comments 1,200 1970 About 200 Carterfone	79-85 — 1,850 January 1976 — Carterfone
<b>COMMENTS</b>	Microprocessor- based; other inter- faces and the Selectable Dual Character Set are available	Made by Teletype as Model 33 ASR; 18-month lease ranges from \$51 to \$58 per month	Month-to-month rental ranges from \$69 to \$90 per month	Made by GE as TermiNet 300; 30-day rental only, at approx. \$150 per month	Made by Digital Equipment Corp.; Techtran 4200 is optional at \$77/ mo. or \$1,900 purchase

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Casio Typuter Models 300/301, 400, & 500	Centronics 101, 101A, 101AL, and 101S	Centronics 102A and 102AL	Centronics 104	Centronics 306 and 306C
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	No No No	No No No	No No No	No No No	No No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	Model 300 & 301 Model 400 500; 8-level No None	Yes No No No None	Yes No No No None	Yes No No No None	Yes No No No None
Portable	No	No	No	No	No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No Yes 35 No Checking only No No	No Yes 132 No — Opt. No	No Std. 132 No — Opt. No	No Std. 132 No — No No	No Std. 80 No — Opt. No
<b>PRINTER CHARACTERISTICS</b> Type Technique	Non impact Ink-set printing	Impact 5/9 x 7 dot matrix	Impact 9 x 7 dot matrix	Impact 5/9 x 7 dot matrix	Impact 5/9 x 7 dot matrix
Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	80; 136 opt. 33 96 ASCII Std. 10 2/3/6 Friction Std. No None	132 165 64 ASCII Opt. 10 6 Pin (adj. tractor) — Std. Double-width boldface chars. std.	132 330 64; 128 ASCII opt. Opt. 10 6 Pin (adj. tractor) Std. Opt. Double-width boldface chars. std.	132 660 64; 128 ASCII opt. Opt. 10 6/8 Pin (adj. tractor) Std. Std. —	80/96/132 100/120/165 64; 128 ASCII opt. Opt. 10/12/16.5 6 Pin (adj. tractor) Std. Opt. Double-width boldface chars. std.
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangements Character set Features	Typewriter 128 ASCII Character repeat	— — —	— — —	— — —	— — —
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	— — — — — — Char. by char. Serial (TTL)	Half/full duplex Asynchronous 110-9600 8-lvl. ASCII/EBCDIC No No Char. by char. RS-232C opt.	Half/full duplex Asynchronous 110-9600 8-level ASCII 10/11 bits/char. No Char. by char. RS-232C opt.	Half/full duplex Asynchronous 110-9600 8-level ASCII 10/11 bits/char. No Char. by char. RS-232C opt.	Half/full duplex Asynchronous 110-9600 8-level ASCII 10/11 bits/char. No Char. by char. RS-232C opt.
Integral modem Telephone coupler	No No	No No	No No	No No	No No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	— — See Comments January 1975 Over 300 —	Contact vendor — 4,095-4,620 March 1971 — Centronics	Contact vendor — 4,675-4,825 3rd qtr. 1972 — Centronics	374 125 (3-yr.) 6,235 May 1975 — Centronics	Contact vendor — 2,055-2,560 March 1973 — Centronics
<b>COMMENTS</b>	OEM only; purchase prices are \$950 for Model 300/301, \$1,750 for 400, and \$2,110 for 500; quantity discounts available	101S prints bar code chars.; see Report 70D-127-01 for details	See Report 70D-127-01 for details	See Report 70D-127-01 for details	306 is 120-cps, 80-col. unit; 306C has any 2 selectable parameter sets; see Report 70D-127-01 for details

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Centronics 308	Centronics 330	Centronics 500	Centronics 501	Centronics 508
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	No No No	No No No	No No No	No No No	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices  Portable	Yes Yes No No None No	Yes Yes No No None No	Yes No No No None No	Yes No No No None No	Yes Yes No No None No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No Std. 120 No Both std. No Opt.	No Std. 120 No Std. No Opt.	No Std. 132 No — Opt. No	No Std. 132 No — No No	No Std. 120 Yes Both std. No Opt.
<b>PRINTER CHARACTERISTICS</b> Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Impact 9 x 7 dot matrix  80 165 64; 128 ASCII opt. Std. 10 6 Pin (adj. tractor) Std. Opt. Backspace and double-width bold- face chars. std.	Impact 9 x 7 dot matrix  80 165 96 ASCII Std. 10 6 Pin (adj. tractor) Std. Opt. Double-width boldface chars.	Impact 5/9 x 7 dot matrix  132 120 64; 128 ASCII opt. Opt. 10 6 Pin (adj. tractor) Std. Opt. Double-width boldface chars. std.	Impact 5/9 x 7 dot matrix  132 165 64; 128 ASCII opt. Opt. 10 6 Pin adj. tractor) Std. Opt. Double-width boldface chars. std.	Impact 9 x 7 dot matrix  132 165 64 ASCII Opt. 10 6 Pin (adj. tractor) Std. Opt. Backspace and boldface chars. std.
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	53/62-key Teletype 64/128 ASCII Character repeat	53/62-key Teletype 96 ASCII Character repeat	— — —	— — —	53/62-key Teletype 64/128 ASCII Character repeat; numeric pad opt.
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface  Integral modem Telephone coupler	Half/full duplex Asynchronous 110-9600 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C, 20/60 ma. dc current  No No	Half/full duplex Asynchronous 110-1200 8-level ASCII 10/11 bits/char. Opt. Char. by char. RS-232C or 20/60 ma dc current  No No	Half/full duplex Asynchronous 110-9600 8-level ASCII 10/11 bits/char. No Char. by char. RS-232C opt.  No No	Half/full duplex Asynchronous 110-9600 8-level ASCII 10/11 bits/char. No Char. by char. RS-232C opt.  No No	Half/full duplex Asynchronous 110-9600 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C, 20/60 ma. dc current  No No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	269 111 (3-yr.) 3,130-4,000 March 1974 — Centronics	Contact vendor — 2,700-3,000 September 1975 — Centronics	232 151 (3-yr.) 2,995-3,195 March 1974 — Centronics	249 108 (3-yr.) 3,515 November 1974 — Centronics	331 133 (3-yr.) 4,130-5,000 June 1974 — Centronics
<b>COMMENTS</b>	See Report 70D-127-01 for details	See Report 70D-127-01 for details; last character printed is visible	See Report 70D-127-01 for details	See Report 70D-127-01 for details	See Report 70D-127-01 for details

## All About Teleprinter Terminals

SUPPLEIR AND MODEL	Centronics 530	Centronics 588	ComData Series 33	ComData Series 38	ComData Series 700
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	No No No	No No No	Yes No No	Yes No No	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices  Portable	Yes Yes No No None No	Yes No No No None No	Yes Yes Yes; 8-level Opt. Opt. No; mobile opt.	Yes Yes Yes; 8-level Opt. Opt. No	Yes Yes No Yes; cassette Opt. card reader Models 735, 743, and 745
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No Std. 120 No Std. No Opt.	No Std. 132 No — No No	No No — Char. only Gen. std.; chk. opt. Opt. Opt.; std.	No No — Char. only Gen. std.; chk. opt. Opt. Opt.; std.	No No — Both on ASR Gen. std. Opt. on 733 Opt.
<b>PRINTER CHARACTERISTICS</b> Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Impact 9 x 7 dot matrix  132 165 96 ASCII Std. 10 6 Pin (adjustable) Std. Opt. Double-width boldface chars. std.	Impact 5/9 x 7 dot matrix  132 88 64; 128 ASCII opt. Opt. 10 6 Pin (adj. tractor) Std. Opt. Double-width boldface chars. std.	Impact Full char. printing via rotating type cylinder  74 10 64 ASCII No 10 6/3 Pin std. No No Prints lower-case alphabets as upper-case equiv.	Impact Full char. printing via rotating type cylinder  132 10 94 ASCII Std. 10 6/3 Pin std. No No Two-color printing and APL charac- ters	Non-impact 5 x 7 dot matrix  80 10/15 94 ASCII Opt. 10 6/3 None or friction No No None
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	53/62-key Teletype 96 ASCII Character repeat	— — —	53-key teleprinter 64 ASCII Character repeat; numeric pad opt.	63-key teleprinter 128 ASCII Character repeat, break, APL, nu- meric pad opt.	55-key teleprinter 96/128 ASCII Character repeat, break
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110-1200 8-level ASCII 10/11 bits/char. Opt. Char. by char. RS-232C or 20/60 ma. dc current	Half/full duplex Asynchronous 110-9600 8-level ASCII 10/11 bits/char. No Char. by char. RS-232C opt.	Half/full duplex Asynchronous 110 8-level ASCII 11 bits/char. No Char. by char. 20/60 ma. dc current; RS-232C	Half/full duplex Asynchronous 110 8-level ASCII 11 bits/char. No Char. by char. 20/60 ma. dc current; RS-232C	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. 20/60 ma. dc current; RS-232C
Integral modem Telephone coupler	No No	No No	Opt. Opt.	Opt. Opt.	Opt. Opt.
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two-year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	Contact vendor — 2,950-3,250 September 1975 — Centronics	195 84 (3-yr.) 2,760 January 1975 — Centronics	69-158 38-87 851-1,735 — — ComData & others	96-159 53-88 1,050-1,750 — — ComData & others	131-319 72-175 1,450-3,500 1974 — ComData & others
<b>COMMENTS</b>	Last character printed is visible	See Report 70D-127-01 for details	Teletype 33 KSR or ASR with Com- Data acoustic coupler or modem for TWX and DDD networks; 33 ASR TWX/DDD termi- nal costs \$1,649	Teletype 38 KSR or ASR with Com- Data acoustic coupler or modem for TWX and DDD networks	Produced by Texas Instruments as T1 Models 733, 735, 743, and 745; all ComData lease prices are full pay- out w./purchase option and ex- clude maintenance

## All About Teleprinter Terminals

SUPPLIER AND MODEL	ComData Series 933	ComData Series LA-36	Compro Corp. Model 1030	Compro Corp. Model 3000	Compro. Corp. Model 3500 (strip printer)
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes 2740-1 only Opt.	Yes No No	Yes Yes Yes	Yes Yes Yes	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices  Portable	Yes Yes Yes; 8-level  Yes; cassette  Opt.  No	Yes Yes Opt.  Opt.; cassette  None  No	Yes Yes Opt.  Yes; cassette  None  Yes; 25 lbs.	Yes Yes Opt.  Yes; cassette  None  Opt.; 35 lbs.	No Yes No  Yes; cassette  None  Yes; 12 lbs.
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	Print format only Yes 128 No Both std. Opt. Opt.	No No — No No Opt. Opt.	Yes Opt. — Opt. Yes Opt. Opt.	Yes Opt. Variable Opt. Opt. Opt. Opt.	No No — No Yes Opt. Opt.
<b>PRINTER CHARACTERISTICS</b> Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Impact Full character printing via daisy wheel 132/156 10/15/30 94 ASCII, APL Std. 10/12 6/8 Pin; tractor opt. Std. Std. Incremental plotting (30 pps)	Impact 7 x 7 dot matrix  132 10/15/30 96 ASCII Std. 10 6 Pin (adj. tractor) Opt. Opt. —	Impact Full char. printing via type belt  80 30 64 ASCII Opt. 10/12 6 Friction Opt. Opt. None	Impact Full char. printing via type belt  80 30 96 ASCII Std. 10/12 6/8 Friction; pin opt. Opt. Opt. Proportional spacing opt.	Impact Full char. printing via helical type wheel See Comments 30 64 ASCII No 10 — — — None
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	73-key teleprinter 128 ASCII, APL Char. repeat, break, upper-case lock, numeric pad	68-key teleprinter 128 ASCII, APL Char. repeat, break, upper-case lock, numeric pad	53-key typewriter 128 ASCII Character repeat	61-key typewriter 128 ASCII Character repeat	53-key typewriter 64 ASCII Character repeat
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface  Integral modem Telephone coupler	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. 20/60 ma. dc current; RS-232C  Opt. Opt.	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. 20 ma. dc current; RS-232C opt.	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Yes Char.; block opt. RS-232C; 60 ma. dc opt.	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Yes Char.; block opt. RS-232C  Opt. Std.	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Yes Char. by char. RS-232C; 60 ma. dc opt.  Opt. Std.
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	259-519 142-285 2,850-5,700 1974 — ComData & others	— — 1,750-6,000 1975 — DEC & others	155 110 3,100-4,000 September 1974 — Compro	175 140 3,500-4,400 February 1976 — Compro	100 75 1,400 May 1974 — Compro
<b>COMMENTS</b>	Contains a Diablo HyType printer mechanism; APL version or EBCDIC character set available	Microprocessor based; produced by Digital Equipment Corp. as LA-36 DECwriter II	Microprocessor based	APL and EBCDIC versions also available; micro- processor based	Prints on paper tape strip; battery powered



## All About Teleprinter Terminals

SUPPLIER AND MODEL	Compro Corp. Model 6000	Compunetics Model 1472	Computer Devices CDI 1030 Series	Computer Devices CDI 1132	Computer Devices Miniterm 1200
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes Yes Yes	No No Yes	Yes No Yes	Yes No Yes	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices  Portable	Yes Yes Opt.  Yes; cassette  None  No	No Yes No  No  None  Yes	No Yes 8-level opt.  RS-232 interface for cassette unit None  Yes; 22 lbs.	No Yes Yes  RS-232 interface for cassette unit None  Yes; 25 lbs.	Yes (1201) Yes (1202) Yes  Yes; cassette  None  Yes; 17 lbs.
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	Yes Opt. — Opt. Yes Opt. Opt.	No No — No Both std. No No	No No — No Selectable check. No No	No No — No Selectable check. No No	No Yes 4,080 No Checking only No No
<b>PRINTER CHARACTERISTICS</b> Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Impact Full char. printing via type belt  132 30 96 ASCII Yes 10/12 6/8 Friction Opt. Opt. Proportional spacing optional	Impact Full char. printing via IBM Selectric mechanism 130/155 15 88 Std. 10/12 6 Friction; pin opt. Yes Yes None	Non-impact Thermal; 5 x 7 dot matrix 80 10/15/30 96 ASCII/Corres. Std. 10 6 Friction No No None	Non-impact 5 x 7 dot matrix 132 10/15/30 96 ASCII/Corres. Std. 10 6 Friction No No None	Non-impact Thermal; 5 x 7 dot matrix 80 30 96 ASCII Std. 10 6 Friction No No None
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	61-key typewriter 128 ASCII Character repeat	58-key typewriter 64 Character repeat	53-key type 64/94/96/188/192 Numeric pad opt.	53-key typewriter 64/94/96/188/192 Char. repeat; numeric pad opt.	Teleprinter 128 ASCII Char. repeat; break, numeric lock
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface  Integral modem Telephone coupler	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Yes Char.; block opt. RS-232C  Opt. Std.	Half/full duplex Asynchronous Up to 134.5 PTTC/EBCDIC 9 bits/char. No Char. by char. RS-232C  No No	Half/full duplex Asynchronous 110/150/300 See Comments 10/11 bits./char. Yes Char. by char. RS-232C or CCITT  Std. Std.	Half/full duplex Asynchronous 110/150/300 See Comments 10/11 bits/char. Std. Char. by char. RS-232C  Std. Std.	Half/full duplex Asynchronous 110/150/300/1200 8-level ASCII 10/11 bits/char. Std. Char. by char. 20/40/60 ma. dc current and RS-232C No No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	200 150 4,000-6,000 September 1974 — Compro	100 Contact vendor 2,900 1972 25 Compunetics	125-170 — 2,785-3,700 April 1970 6,000 Olivetti	165-200 — 3,900-5,000 August 1974 1,000 Olivetti	— — 1,750-2,650 February 1976 — Olivetti
<b>COMMENTS</b>	APL and EBCDIC versions also avail- able; micropro- cessor based	APL versions available	Transmission code can be 8-level ASCII or 7-level Correspondence; available with ASCII, Corres- pondence, or APL character sets	Transmission code can be 8-level ASCII or 7-level Correspondence; APL, ASCII, or Correspondence char. sets avail- able	Has 3-mode key- board: typewriter, teleprinter, or numeric only

## All About Teleprinter Terminals

SUPPLIER AND MODEL	CTSI Execuport 300	CTSI Execuport 300D	CTSI Execuport 1200	Control Data 9316 Matrix Printer	Data Access System DCT 500 & System 4150
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No No	Yes No No	No No No	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	Yes Yes 5- to 8-level opt. Optional cassette None	No Yes 5- to 8-level opt. Optional cassette None	No Yes 5- to 8-level opt. Optional cassette None	Yes No No No None	Yes No Yes; 8-level Yes; cassette None
Portable	Yes; 29 lbs.	Yes	No	No	No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No No — No Checking only No Opt.	No No — No Checking only No No	No No — No Checking only No Opt.	No Std. 132 No Opt. No Opt.	No No — 4150 only Both Opt. Opt.
<b>PRINTER CHARACTERISTICS</b> Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Non-impact Thermal; 5 x 7 dot matrix  80-132 10/15/30 128 ASCII Std. 10 6 Friction No No —	Non-impact Thermal; 5 x 7 dot matrix  136 10/15/30 128 ASCII Std. 10 6 Friction No No —	Impact 5 x 7 dot matrix  132 10/30/120 128 ASCII Std. 10 6 Pin Opt. Opt. Top of form	Impact 7 x 7 dot matrix  132 173 (55-100 lpm) 64/96/128 ASCII Opt. 10 6 Pin (tractor) No Opt. Test print	Impact Full char. printing via helical type- wheel 132 10/15/30 64 ASCII No 10 6 Pin No No Tractor feed
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	63-key typewriter 128 ASCII Numeric pad opt.; char. repeat std.; APL char. set	63-key typewriter 128 ASCII Char. repeat std.; numeric pad opt.	63-key typewriter 128 ASCII Numeric pad opt.; char. repeat std.; APL char. set	— — —	61-key typewriter 128 ASCII Automatic car- riage return
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Yes Char. by char. RS-232C; 20 ma. dc current	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Yes Char. by char. RS-232C; 20 ma. dc current	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Yes Char.; block opt. RS-232C; 20 ma. dc current	Simplex Asynchronous 150-9600 8-level ASCII 10/11 bits/char. — Char. by char. RS-232C	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C
Integral modem Telephone coupler	Std. Std.	Std. Std.	No No	No No	No Opt.
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	122 (basic) 115 (basic) 2,700-2,800 1968 Over 5,000 Western Union	155 (basic) — 3,700 (basic) February 1976 — Western Union	240 (basic) Contact vendor 4,995 August 1973 Over 100 Western Union	— — 2,350 (basic) February 1975 — Third party	80-140 70-130 1,500-2,500 1965 Over 150 DAS
<b>COMMENTS</b>	Available with ASCII, EBCDIC, or APL character set	Available with ASCII, EBCDIC, or APL character set	Available with ASCII, EBCDIC, or APL character set	Printer sold OEM only; accommo- dates 5-part forms 4 to 16.75 inches wide by 2 to 18 inches long	UNIVAC DCT 500; System 4150 combines Techtran 4100 cassette unit

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Data Access System 725	Data Access DASI 735	Data Access DASI 745	Data Access DASI 300/S	Data Access DASI 360
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No No	Yes No No	Yes No Opt.	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	Yes Yes No No None	No Yes No No None	No Yes No No None	Yes Yes No Opt. None	No Yes No Yes; cassette Diskette opt.
Portable	Yes; 37 lbs.	Yes; 25 lbs.	Yes; 13 lbs.	No	No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No No — Char. and line No No Opt.	No No — No Generation only No Opt.	No Yes 6 No Generation only No Opt.	No Std. 128 No Both std. No	No Yes 16 No 7 No No
<b>PRINTER CHARACTERISTICS</b> Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Non-impact Thermal; 5 x 7 dot matrix  80 10/15/30 64 ASCII Opt. 10 6 Friction No No —	Non-impact Thermal; 5 x 7 dot matrix  80 10/15/30 96 ASCII Std. 10 6 Friction No No —	Non-impact Thermal; 5 x 7 dot matrix  80 10/30 69 ASCII No 10 6 Friction No No —	Impact Full char. printing via daisy wheel  132/156 10/15/30 64 ASCII Std. 10/12 6/8 Friction; pin opt. Std. Opt. Tractor opt. in- cremental plotting, super- & subscripts	Impact 7 x 7 dot matrix  132 10/15/30 96 ASCII Std. 10/16.5 opt. 6 Pin No No Tractor feed, APL set, auto line feed opt.
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	61-key typewriter 128 ASCII Char. repeat; numeric pad opt.	Typewriter 96 ASCII Char. repeat, break	Typewriter 97 ASCII Char. repeat, break, numeric pad	58-key typewriter 128 ASCII Char. repeat; numeric pad opt.	58-key typewriter 128 ASCII Numeric pad opt.; char. repeat & break std.
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. 100 char./block RS-232C	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C	Half/full duplex Asynchronous 10/30 8-level ASCII 10/11 bits/char. Std. Char. by char. None	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C	Half/full duplex Asynchronous 110/150/300 8-level ASCII — — Char. by char. 20 ma. dc current or RS-232C
Integral modem Telephone coupler	Std. Std.	No Std.	No Std.	No Opt.	No No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	95 85 1,450 1969 Over 500 DAS	135 125 2,295 — — —	125 115 1,995 — — —	155 145 3,000 1974 300 DAS	95-110 85-100 1,670-2,070 December 1974 — DAS
<b>COMMENTS</b>	Texas Instru- ments Model 725	Built by Texas Instruments as Model 735	Built by Texas Instruments as Model 745	Employs micropro- cessor with change- able ROM; Diablo HyType printer	Built by DEC as the DECwriter II

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Data Access DASI 450	Data Input 220 Typescribe	Data Measurements DMC 201/220	Data Measurements DMC 400	Data Measurements DMC 442
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	No No No	No No No	Opt. Opt. Opt.	No 442-2 only No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices  Portable	No Yes No Yes; cassette Diskette opt. No	No No No Yes; IBM MTST cartridge None No	No Yes No No None No	No Yes Opt. Opt. CRT opt. No	No Yes No Opt. CRT opt. No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No Yes 132 No Checking only No Opt.	No No — No Both std. No Opt.	No 220 only 120 220 only Std. 220 only 220 only	Yes Std. Up to 64K Opt. Std. Std. Opt.	No Std. Up to 32K Opt. Std. Std. Opt.
<b>PRINTER CHARACTERISTICS</b> Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Impact  132/156 45 128 ASCII Std. 10/12 6/8 Friction; pin opt. Std. Std. Variable forms length; super- & subscripts	Impact Full char. printing via IBM Selectric I & II mechanism 130/156 15 88 Std. 10/12 6/8 Friction Std. No —	Impact Full char. printing via IBM Selectric mechanism 85/132/156 14.8 44 BCD 220 only 10/12 6/8 Friction; pin opt. Std. No Split platen, docu- ment insertion (220 only)	Impact Full char. printing via daisy wheel  132/156 30 96 ASCII Std. 10; 12 opt. 6; 8 opt. Friction; pin opt. Opt. Opt. Split platen	Impact Full char. printing via daisy wheel  132; 156 opt. 30 88 ASCII Std. 10; 12 opt. 6; 8 opt. Friction; pin opt. Opt. No Split platen opt.
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	Typewriter 128 ASCII Numeric pad	55-key typewriter 88 Char. repeat	58-key typewriter 44 BCD —	Typewriter 96 ASCII Character repeat, numeric pad opt.	55-key typewriter 88 ASCII Numeric pad opt.
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. 20 ma. dc current or RS-232C	Half/full duplex Asynchronous 1200 8-level Corres. 10 bits/char. No 256 char./block RS-232C	Half duplex Asynchronous Up to 150 6-level BCD 9 bits/char. No Up to 120 (220) RS-232C	Half/full duplex Asynchronous Up to 4800 Any Any Opt. Variable RS-232C	Half/full duplex Asynchronous Up to 1800 9-level BCD — No 1 to 440 chars. RS-232C
Integral modem Telephone coupler	No External only	No No	Opt.; 201 only Opt.	Opt. Opt.	Opt. No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	160-175 150-165 2,890-3,180 March 1976 — —	165-255 145-235 3,600-6,100 1971 250 Data Input	— — 3,000-4,405 March 1970 Over 2,000 DMC, RCA, and Western Union	— — 5,000-7,500 Third qtr. 1973 800 DMC, RCA, and Western Union	— — 5,250-7,500 June 1974 400 Third party
<b>COMMENTS</b>	Built by Diablo as HyTerm; uses HyType II printer; APL optional	Record only, re- cord and play- back, and commu- nications options added to user- supplied IBM Selectric type- writer	DMC 201 is a PARS terminal; DMC 220 is de- signed for con- sumer finance industry; available from Bell of Canada	Employs Diablo HyType printer mechanism; avail- able in Canada	Available from Bell of Canada as Datacom 600

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Dataproducts PortaCom	Data Terminals & Communications DTC-300/S	Data Terminals & Communications HyWriter	Data Terminals & Communications DTC-302	Diablo 1550 Series
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No Opt.	Yes No No	Yes No No	Yes, some models Yes, some models Yes, some models
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	No Yes No Yes; cassette None	No Yes No Interface only None	Yes No No Interface only None	No Yes No No Diskette	No Yes No No None
Portable	Yes; 30 lbs.	Mobile (castors)	No	No	No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No No — No Both No No	Yes, by vendor Std. 128 No Selectable (both) Opt. Opt.	No Std. 128 No Selectable (both) Opt. Opt.	No Std. 128 No Selectable (both) No No	No Std. 120/248/440 Both std. Both std. Std. No
<b>PRINTER CHARACTERISTICS</b> Type Technique	Impact Full char. printing	Impact Full char. printing via daisy wheel	Impact Full char. printing via daisy wheel	Impact Full char. printing via daisy wheel	Impact Full char. printing via daisy wheel
Character positions per line	80	132/158	132/158	132/158	132/158
Print rate, char/second	10	10/15/30	10/15/30	45/55	30
Character set	64 ASCII	128 ASCII	128 ASCII	128 ASCII	94 ASCII
Lower case alphabetic	No	Std.	Std.	Std.	Std.
Horizontal pitch, char/inch	10.8	10/12	10/12	10/12	10/12
Vertical spacing, lines/inch	6	6/8	6/8	6/8	6/8
Forms feed	Pin or friction	Friction; pin opt.	Friction; pin opt.	Friction; pin opt.	Friction; pin opt.
Horizontal tabulation	No	Std.	Std.	Std.	Std.
Vertical formatting	No	Std.	Std.	Std.	Std.
Other features	—	Incremental plotting and tractor feed	Incremental plotting and tractor feed	Incremental & vector plotting; tractor feed	Adj. tractor opt.; plotting std.; APL set
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	58-key typewriter 128 ASCII Numeric pad std.	72-key typewriter 128 ASCII Character repeat, Here IS key, numeric pad	— — —	78-key typewriter 128 ASCII Char. repeat, break, numeric pad	Typewriter 128 ASCII/APL Char. repeat, break, numeric pad, send buffer
<b>TRANSMISSION</b> Mode Technique Speed; bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 300 8-level ASCII 11 bits/char. No Char. by char. Acoustic; RS-232C; CCITT	Half/full duplex Asynchronous Up to 300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C, 20-80 ma. dc current	Simplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Opt. Char. by char. RS-232C, 20-80 ma. dc current	Half/full duplex Asynchronous 110-1200 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C, 20-80 ma. dc current	Half/full duplex Asynchronous 134.5/300/600/1200 See Comments 9/10/11 bits/char. Std. Char. by char. RS-232C
Integral modem	Std.	Opt.	Opt.	Opt.	No
Telephone coupler	Std.	Opt.	Opt.	Opt.	No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	— — 1,495 (basic) March 1970 Over 2,000 Sorbus	175-203 164-185 2,999-3,500 August 1973 2,700 DT&C and Dow Jones	150-153 141-144 2,790-2,890 April 1974 500 DT&C and Dow Jones	— — 3,590-4,200 January 1976 — DT&C Dow Jones	— — 5,050 1972 — Diablo & third party
<b>COMMENTS</b>		Employs Diablo HyType I printer; APL type fonts and keytops available; other transmission speeds & codes optional	Employs Diablo HyType I printer; APL type fonts and keytops available; other transmission speeds & codes optional	Employs Diablo HyType II printer; APL type fonts and keytops available; other transmission speeds & codes optional	OEM only; PTTC/EBCD & ASCII codes available; uses HyType I printer mechanism; \$4,000 per unit in 100-unit quantities

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Diablo 1600 Series HyTerm	DI-AN Controls 9030 Mark II	Digital Equipment LA 35/LA 36 DECwriter II	Digital Equipment LA 180	Extel AE, AF, & AH Series
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No No	Yes No No	Yes No No	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	Yes (1610) Yes (1620) No No None	Yes Yes Yes Yes None	Yes (LA 35) Yes No No None	Yes No No No None	Yes No No No None
Portable	No	No	No	No	Yes; 17-32 lbs.
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No Std. 158 No Both std. No No	No Std. 168 No Switchable No Opt.	No Std. 16 No Both std. No No	No Std. 132 No Checking only No Yes	No No — No Checking opt. Opt. Opt.
<b>PRINTER CHARACTERISTICS</b> Type Technique	Impact Full char. printing via daisy wheel	Impact 5 x 7 dot matrix	Impact 7 x 7 dot matrix	Impact 7 x 7 dot matrix	Impact 5 x 7 dot matrix
Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	132/158 45 94 ASCII Std. 10/12 6/8 Friction; pin opt. Std. Std. Adj. tractor, APL set opt.; plotting std.	132 10/15/30 96 ASCII Std. 10 6 Pin Opt. Opt. Tractor feed	132 10/15/30 96 ASCII Std. 10/16.5 opt. 6 Pin No No Tractor feed, APL set, auto line feed opt.	132 180 96 ASCII Std. 10/16.5 6 Pin (adj. tractor) No No Top-of-form	69/74/80 15/30 ASCII/Baudot Opt. 10/11/12 4.4/6 Friction No No —
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	Typewriter 128 ASCII Char. repeat; break, 8-char. send buffer std.	64-key typewriter 128 ASCII Character repeat std., numeric pad opt.; break & view	58-key typewriter 128 ASCII Numeric pad opt.; char. repeat & break std.	— — —	— — —
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C; 20/60 ma. dc current opt.	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. 20 ma. dc current std.; RS-232C or CCITT opt.	Simplex Asynchronous Up to 9600 8-level ASCII 10/11 bits/char. No Char. by char. Opt.; RS-232C 20 ma. dc, or CCITT	Half/full duplex Asynchronous 300 See Comments 7.5/8.5/10/11 bits Std. Char. by char. RS-232C; 20 or 60 ma. dc, or CCITT
Integral modem Telephone coupler	No No	No Opt. (external)	No No	No No	Opt. No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Served by	— — — — — Diablo & third party	— — See Comments April 1976 — Third party	— — See Comments November 1974 — DEC	— — 3,085 January 1976 — DEC	— — 1,285-1,819 1972 40,000 RCA Service Co.; Dow Jones
<b>COMMENTS</b>	OEM only; 20% discount in lots of 100 units; employs HyType II printer	Very small physi- cal size; RO sells for \$1,790; KSR sells for \$1,995	Supersedes DEC LA30; LA36 is priced at \$2,075. LA 35 is priced at \$1,995	Includes a paral- lel interface; a serial interface is scheduled for June 1976	Codes includes 5-level Baudot or 8-level ASCII; leased by RCA, Translux, and TLC



## All About Teleprinter Terminals

SUPPLIER AND MODEL	Extel KAF Series	Extel B 200	Extel B 300 S	Extel B 300 PS	Facit Models 3821, 3841, and 3851
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No No	Yes No No	Yes No No	No No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	No Yes No No None	No Yes No No None	No Yes No No 2K/4K memory	No Yes Yes; 5-8 level No 2K-10K memory	3841 3821, 3851 No No None
Portable	Yes; 23-32 lbs.	No	No	No	No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No No — No Both opt. Opt. Opt.	No No — Both opt. Opt. Opt.	No No — Both opt. Opt. Opt.	No No — Both opt. Opt. Opt.	No No — No Yes No No
<b>PRINTER CHARACTERISTICS</b> Type Technique	Impact 5 x 7 dot matrix	Impact 5 x 7 dot matrix	Impact 5 x 7 dot matrix	Impact 5 x 7 dot matrix	Impact Full char. printing via type bar
Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	69/74/80 15/30 96 ASCII Opt. 10/11/12 4.4/6 Friction No No —	69/74/80/90 30 ASCII/Baudot Opt. 10/11/12 4.4/6 Friction No No Boldface chars. & ½ line feed	69/74/80/90 30 ASCII/Baudot Opt. 10/11/12 4.4/6 Friction No No Boldface chars. & ½ line feed	69/74/80/90 30 ASCII/Baudot Opt. 10/11/12 4.4/6 Friction No No Boldface chars. & ½ line feed	132-194 10-15 128 ASCII Std. 10 6 Friction Std. No —
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	53-key typewriter 128 ASCII/64 Bau. N-key rollover	58-key typewriter 128 ASCII/64 Bau. —	58-key typewriter 128 ASCII/64 Bau. Memory edit	58-key typewriter 128 ASCII/64 Bau. Memory edit	46-key typewriter 128 ASCII —
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 300 See Comments 7.5/8.5/10/11 bits Std. Char. by char. RS-232C; 20 or 60 ma. dc, or CCITT	Half/full duplex Asynchronous 45-300 See Comments 7.5/10/11 bits Std. (any 3) Char. by char. RS-232C, dc cur- rent, or CCITT	Half/full duplex Asynchronous 45-300 See Comments 7.5/10/11 bits Std. (any 3) Char. by char. RS-232C, dc cur- rent, or CCITT	Half/full duplex Asynchronous 45-300 See Comments 7.5/10/11 bits Std. (any 3) Char. by char. RS-232C, dc cur- rent, or CCITT	Half/full duplex Asynchronous 110 8-level ASCII 11 bits/char. No Char. by char. RS-232C, 20 or 60 ma. dc current
Integral modem Telephone coupler	No No	Opt. No	Opt. No	Opt. No	No No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Served by	— — 1,750-2,005 1974 500 Dow Jones	85-104 83-102 1,750-2,150 December 1975 50 RCA Service Co., Dow Jones	95-139 93-135 1,950-2,850 January 1976 20 RCA Service Co., Dow Jones	169-215 164-211 3,485-4,450 February 1976 — RCA Service Co., Dow Jones	— — 1,545 1973 — Facit
<b>COMMENTS</b>	Codes include 5-level Baudot or 8-level ASCII; leased by RCA, Translux, and TLC	Codes include 5-level Baudot or 8-level ASCII; a micro- processor based unit, leased by TLC	Codes include 5-level Baudot or 8-level ASCII; a micro- processor based unit, leased by TLC	Codes include 5-level Baudot or 8-level ASCII; a micro- processor based unit, leased by TLC	Codes include 5-level Baudot or 8-level ASCII; a micro- processor based unit, leased by TLC

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Facit Model 4553	Facit Model 4554	Gen-Com Systems Models 300 and 9000	General Electric TermiNet 300	General Electric TermiNet 1200
COMPATIBILITY					
Teletype 33/35	No	No	Yes	Yes	Yes
IBM 2740-1/2740-2	No	No	No	No	No
IBM 2741	No	No	Opt.	No	No
MODEL CONFIGURATIONS					
Printer only (RO)	Yes	Yes	Yes (Mdl. 9000)	Yes	Yes
Keyboard and printer (KSR)	No	No	Yes	Yes	Yes
Keyboard, printer, and punched tape reader/punch (ASR)	No	No	Opt.	Yes; 8-level	Yes; 8-level
Keyboard, printer, and magnetic tape recorder (ASR)	No	No	Opt. cassette	Yes; cassette	Yes; cassette
Other devices	No	No	Diskette	None	None
Portable	No	No	No; mobile	No	No
TERMINAL FEATURES					
Programmed by user	No	No	No	No	No
Internal buffer	No	No	Std.	No	No
Internal buffer capacity, chars.	—	—	238	—	—
Editing, line and/or character	No	No	No	No	No
Parity checking/generation	No	Yes	Std.	Gen.; chk. opt.	Gen.; chk. opt.
Polling/Addressing capability	No	No	Opt.	Opt.	Opt.
Automatic answer	No	No	No	Opt.	Opt.
PRINTER CHARACTERISTICS					
Type	Impact	Impact	Impact	Impact	Impact
Technique	5 x 7 dot matrix	5 x 7 dot matrix	Full char. printing via daisy wheel	Full character printing via type belt	Full character printing via type belt
Character positions per line	80	80/132	132/158	75 std.; 80/118 opt.	80; 120 opt.
Print rate, char/second	15	60	30	10/15/30; 20 opt.	10/30/120
Character set	64 ASCII	64 ASCII	96 ASCII; others	94 ASCII	94 ASCII
Lower case alphabetic	No	No	Std.	Std.	Std.
Horizontal pitch, char/inch	10	10/16	10/12	10	10
Vertical spacing, lines/inch	6	6	6/8	6/3	6/3
Forms feed	Pin	Pin	Friction; pin opt.	Friction; pin opt.	Pin
Horizontal tabulation	No	No	Std.	Opt.	Opt.
Vertical formatting	No	No	Std.	Opt.	Opt.
Other features	Form control	Form control	Reverse line feed; incremental plot- ting	Tractor feed	Tractor feed, copy holder opt.
KEYBOARD CHARACTERISTICS					
Keyboard arrangement	—	—	61-key typewriter	Typewriter	Typewriter
Character set	—	—	128 ASCII	128 ASCII	128 ASCII
Features	—	—	Char. repeat, numeric pad	Char. repeat, numeric pad opt.	Char. repeat, numeric pad opt.
TRANSMISSION					
Mode	Simplex	Simplex	Half/full duplex	Half/full duplex	Half/full duplex
Technique	Async./sync.	Async./sync.	Asynchronous	Asynchronous	Asynchronous
Speed, bits/second	110/150	110-600	110/150/300	110/150/300	110/300/1200
Code	8-level ASCII	8-level ASCII	8-level ASCII	8-level ASCII	8-level ASCII
Unit code structure	11 bits/char.	11 bits/char.	10/11 bits/char.	10/11 bits/char.	10/11 bits/char.
Operator selectable speeds	No	No	Std.	Std.	Std.
Format	Char. by char.	Char. by char.	Char. by char.	Char. by char.	Char. by char.
Communications interface	RS-232C; 20/60 ma. dc current	RS-232C; 20/60 ma. dc current	RS-232C; 20/60 ma. dc current; CCITT	RS-232C or 20 ma. dc current	RS-232C or 20 ma. dc current
Integral modem	No	No	Opt.	Opt.	Opt.
Telephone coupler	No	No	Opt.	Opt.	300 bps only opt.
PRICING AND AVAILABILITY					
Lease price:					
One year lease, \$	—	—	130 or 175 (base)	105-237	144-250
Two year lease, \$	—	—	—	—	—
Purchase price, \$	1,545	2,095	3,100 or 4,500	3,170-6,610	3,970-7,270
Date of first production delivery	1973	1973	September 1973	July 1969	October 1972
Terminals installed to date	—	—	900	—	—
Serviced by	Facit	Facit	GSI & Olivetti	General Electric	General Electric
COMMENTS			Employs Diablo HyType (300D) or Qume (300Q) print- er mechanism	Transmission speeds of 200/ 600/1200 bps are optional	Speeds of 20/60 cps (200/600 bps) are optional

## All About Teleprinter Terminals

SUPPLIER AND MODEL	General Electric TermiNet 30	Harris 1030 and 1035	Harris 1040	IBM 2740 Models 1 and 2	IBM 2741
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	No No Yes	No 2740-1 Yes	No — —	No — —
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices  Portable	Yes Yes Yes, 8-level  Yes; single or dual cassette None  No	No 1030 No  1035 has cartridge recorder None  No	No Yes No  No  No	No Yes No  No  IBM 2760 Optical Image Unit No	No Yes No  No  No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No No — No Yes No Opt.	No No — 1035 only Both std. No No	No No — No Both std. Opt. No	No 2740-2 only 120;246/440 opt. Opt. Both Yes No	No No — No Both No No
<b>PRINTER CHARACTERISTICS</b> Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Impact 9 x 7 dot matrix  80; 132 opt. 10/20/30 64/96 ASCII Opt. 10; 16.5 opt. 6 Pin No Opt. —	Impact Full char. printing via IBM Selectric mechanism 130/156 15 88 Std. 10/12 6/8 Friction or pin No No Forms aligner and ½ line spacing opt.	Impact Full char. printing via IBM Selectric mechanism 130/156 15 88 Std. 10/12 6/8 Friction or pin No No Forms aligner and ½ line spacing opt.	Impact Full char. printing via IBM Selectric mechanism 130 14.8 88 Std. 10/12 6/8 Friction; pin opt. No No Split friction platen & ledger card handler opt.	Impact Full char. printing via IBM Selectric mechanism 130 14.8 88 Std. 10/12 6/8 Friction; pin opt. No No —
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	Typewriter 128 ASCII Char. repeat std.; numeric pad opt.	55-key typewriter 88 Character repeat std.	55-key typewriter 88 Character repeat std.	55-key typewriter 88 Character repeat std.	55-key typewriter 88 Character repeat opt.
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface  Integral modem Telephone coupler	Half/full duplex Asynchronous 110-1200 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C or 20 ma. dc current  Opt. Opt.	Half duplex Asynchronous 134.5 6-level corr./EBCD 9 bits/char. No Char. by char. RS-232C, DAA, or acoustic  Opt. Opt.	Half duplex Asynchronous 134.5 6-level corr./EBCD 9 bits/char. No Char. by char. RS-232C, DAA, or acoustic  Opt. Opt.	Half duplex Asynchronous 134.5; see Com. See Comments 9 bits/char. No 1 to 440 chars. RS-232C  No No	Half duplex Asynchronous 134.5 See Comments 9 bits/char. No Char. by char. RS-232C  No No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	88-131 78-117 1,685-2,691 March 1975 2,000 General Electric	96 90 1,600 August 1969 4,000 (all models) Harris	90 88 1,600 July 1971 4,000 (all models) Harris	95-282 (30-day) — 3,930-11,806 — — IBM	95-140 (30-day) — 3,930-4,900 — — IBM
<b>COMMENTS</b>		Models 1030 & 1035 are available on an "as re- turned" basis	Available on an "as returned" basis	Model 2 can also operate at 75 or 600 bps (opt.); available with cor- respondence, PTTC/BCD, or PTTC/EBCD code; see Report 70D- 491-02 for details	Available with Correspondence, PTTC/BCD, or PTTC/EBCD code; see Report 70D- 491-03 for de- tails

## All About Teleprinter Terminals

SUPPLIER AND MODEL	IBM 3767 Models 1, 2, and 3	IBM CMC/ST Magnetic Card Selectric Typewriter	Inforex Model 180	Informer H Series	Interdata Carousel 300
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	No Opt. Opt.	No No No	No No No	Yes No No	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices Portable	No Yes No No Magnetic stripe reader No	No Yes No No Magnetic card recorder No	Yes No No No None Yes; 33-40 lbs.	Yes No No No CRT display Yes; 20 lbs.	Yes Yes Yes No None No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	— Yes; 2 (4 optional) 256 each Yes Yes Yes —	No Yes 8,000 Both Both No No	No Yes 80/160 No Checking only No Std.	No Yes 32/480 No Checking Opt. No	No Std. 128 No Both std. No Std.
<b>PRINTER CHARACTERISTICS</b> Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Impact 7 x 8 dot matrix  132 40, 80, or 120 88 EBCD; 96 ASCII Std. 10 6 Friction; pin opt. — Opt. Alternate char. set opt.; APL & others	Impact Full char. printing via IBM Selectric mechanism 130/156 14.8-15.5 88 Std. 10/12 opt. 6;8 opt. Friction; pin opt. Std. Std. —	Non-impact Magnetic; 10 x 12 dot matrix 80/132 180 lpm 96 ASCII; 192 opt. Std. 10-17 6 Friction No Opt. —	Impact 5 x 7 dot matrix  32 110 64 ASCII No 10/12 6 Friction No No Two-color print- ing opt.	Impact Full char. printing via print cup  132 30-40 64/96 ASCII Opt. 10 6 Friction; pin opt. Opt. Opt. Two-color ribbon; electronic format- ting
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	44-key typewriter 88 EBCD; 96 ASCII Character repeat	44-key typewriter 88 —	— — —	— — —	Typewriter 128 ASCII Character repeat, break, numeric pad std.
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half duplex SDLC; async. opt. 300/600/1200/2400 8-level EBCDIC 8 bits/char. No Block or char. RS-232C opt.	Half/full duplex Asynchronous 135 Correspondence 9 bits/char. No Char. by char. RS-232C	Half/full duplex Asynchronous 2400 8-level ASCII 11 bits/char. No Block RS-232C	Simplex Asynchronous 110-9600 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C	Half/full duplex Asynchronous 300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C or 20 ma. dc current
Integral modem Telephone coupler	Opt. Opt.	No No	No No	No No	No No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	176-307 (30-day) 150-261 5,800-9,228 February 1975 — IBM	See Comments 225 10,970 October 1971 8,000 IBM	— — 2,850-3,300 1975 320 Inforex	99 — 810-1,340 — — Informer	— — 2,695-3,600 July 1975 — Interdata
<b>COMMENTS</b>	Supersedes IBM 2740 & 2741 ter- minals; see Report 70D-491-44 for details	For word process- ing use; each card stores 5,000 chars.; 6-mo. rental is \$255/mo.	Acquired from Data Interface as the DI-240; for OEM only	Compatible with Informer CRT display terminals	Contains an Interdata micro- processor; capable of bidirectional printing

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Leasco Model 33 Data Terminal	Leasco Model 30 Data Terminal	Leasco Model 1200 Data Terminal	LogAbax LX 180/KSR	LogAbax LX 180/57
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No No	Yes No No	Yes No No	No 2740-2 No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	Yes Yes Yes No None	Yes Yes No Yes None	Yes Yes No Yes None	No Yes No Pending Pending	No Yes No No None
Portable	No	No	No	No	No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No No — Char. only Gen.std.; chk. opt. Opt. Opt.	No Std. 16 Char. only Both std. Opt. Opt.	No Std. 120 Char. only Both opt. Opt. Opt.	No Std. 256 No Gen. opt. No Opt.	No 2 std. 256 each No Both Both Std. No
<b>PRINTER CHARACTERISTICS</b> Type Technique	Impact Full char. printing	Impact 7 x 7 dot matrix	Impact Full char. printing	Impact 7 x 7 dot matrix	Impact 7 x 7 dot matrix
Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	72 10 64 ASCII No 10 6 Friction No No —	132 10/15/30 96 ASCII Std. 10 6 Pin (adj. tractor) Opt. Opt. ASCII & APL on same unit	120 10/30/120 96 ASCII Std. 10 6 Pin (adj. tractor) Opt. Opt. —	132/158/220 180 128 ASCII Std. 10/12/16.5 6 Pin (adj. tractor) Std. Std. —	132/158/220 180 96 EBCDIC Std. 10/12/16.5 6 Pin (adj. tractor) Std. Std. —
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	53-key Teletype 64 ASCII Char. repeat std., numeric pad opt.	60-key typewriter 128 ASCII Char. repeat std., numeric pad opt.	60-key typewriter 128 ASCII Char. repeat std., numeric pad opt.	58-key typewriter 128 ASCII Numeric pad	58-key typewriter 96 EBCDIC 10 keys for prerecorded mes- sages
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Format Communications interface	Half/full duplex Asynchronous 10 8-level ASCII 11 bits/char. Char. by char. 20/60 ma. dc current; RS-232C	Half/full duplex Asynchronous 10/15/30 8-level ASCII 10/11 bits/char. Char. by char. 20/60 ma. dc current; RS-232C	Half/full duplex Asynchronous 10/30/120 8-level ASCII 10/11 bits/char. Char. by char. RS-232C; 20/60 ma. dc current	Half/full duplex Asynchronous 150-2400 8-level ASCII 10/11 bits/char. Char. by char. RS-232C/CCITT	Half/full duplex Asynchronous 600/1200/2400 6-level PTCC/BCD 9/10 bits/char. — RS-232C/CCITT
Integral modem Telephone coupler	Opt. Opt.	Opt. Opt.	Opt. Opt.	Opt. Opt.	Opt. No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	54-80 52-78 800-2,000 1969 5,000 Leasco	87-120 80-110 2,000-3,000 1974 1,000 Leasco	165-200 150-185 4,900-6,000 1970 250 Leasco	180-192 169-179 4,500-4,950 1972 Over 1,500 LogAbax & third party	199 189 6,200 1972 Over 3,000 LogAbax & third party
<b>COMMENTS</b>	TTY 33 KSR & ASR with A/C or modem for TWX & DDD networks	Produced by Digital Equip- ment as LA 36 DECwriter II	Produced by GE as TerminiNet 1200		

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Memorex 1240	Memorex 1242	Memorex 1280	MI <sup>2</sup> Data Systems Design 2400	MI <sup>2</sup> Data Systems Design 2420
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	No 2740-1 Yes	No 2740-2 No	Yes 2740-1 No	Yes Opt. Opt.	Yes Opt. Opt.
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices  Portable	Yes Yes No  No  30-60 cps card or tape interface No	No Yes No  Opt. cassette  CRT display  No	No Yes No  Yes; cassette  None  No	Yes Yes No  Yes  None  No	No Yes No  Yes  None  No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No No — No Checking opt. No Opt.	No Std. 256/440/512 Std. Checking opt. Std. No	No Std. — Std. Checking opt. No Opt.	Yes (tape) Std. 192-300 Both std. Both std. Opt. Std.; opt.	Yes (tape) Std. 192-300 Both std. Both std. Opt. Std.; opt.
<b>PRINTER CHARACTERISTICS</b> Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Impact Full char. printing via moving type belt 120 10/15/30/60 94 ASCII Std. 10 6 Friction or pin Opt. —	Impact Full char. printing via moving type belt 120 120; 30/60 opt. 94 ASCII Std. 10 6 Friction or pin Opt. —	Impact Full char. printing via moving type belt 120 30/60; 120 opt. 94 ASCII Std. 10 6 Friction or pin Opt. —	Impact 5 x 7; others opt. dot matrix 132 180 96 ASCII Std. 10 6 Pin (adj. tractor) Opt. Std. —	Impact 5 x 7; others opt. dot matrix 80/132/256 220 96 ASCII Std. 10 6 Pin (adj. tractor) Opt. Std. —
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	60-key typewriter 128 ASCII Two-key rollover; char. repeat; numeric pad opt.	60-key typewriter 128 ASCII Two-key rollover; char. repeat; numeric pad opt.	60-key typewriter 128 ASCII Two-key rollover; char. repeat; numeric pad opt.	52-key Teletype 96 ASCII Char. repeat std.; numeric pad opt.	52-key Teletype 96 ASCII Char. repeat std.; numeric pad opt.
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110/150/300/600 8-level ASCII 10/11 bits/char. Opt. Char. by char. RS-232C	Half/full duplex Asynchronous 1200/1800 8-level ASCII 10 bits/char. No 256 chars. RS-232C	Half/full duplex Asynchronous See Comments 8-level ASCII 10/11 bits/char. Opt. Char. by char. RS-232C	Half duplex Asynchronous 75-9600 8-level ASCII 10/11 bits/char. Std. Char. by char. Parallel; RS-232C opt.	Full duplex Async.; sync. opt. 75-9600 8-level ASCII 7.5/10/11 bits/ch. Std. Char. by char. RS-232C
Integral modem Telephone coupler	Opt. Opt.	Opt. Opt.	Opt. Opt.	Opt. Opt.	Opt. Opt.
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	175-225 — 3,000-4,500 2nd qtr. 1971 Over 1000 Memorex	220-290 — 3,800-4,500 1st qtr. 1972 Over 500 Memorex	250-300 — 4,500-5,000 3rd qtr. 1971 Over 700 Memorex	210-304 180-256 3,295-4,800 March 1976 — MI <sup>2</sup> Data Systems	230-320 190-270 3,595-5,100 April 1976 — MI <sup>2</sup> Data Systems
<b>COMMENTS</b>	120 cps printing speed is optional		Transmits at 110, 150, 300, 600, or 1200 bps	Microprocessor- based with 1K or 2K RAM; 3- or 5- year leases and quantity discounts are available	Microprocessor- based with 1K or 2K RAM; 3- or 5- year leases and quantity discounts are available



## All About Teleprinter Terminals

SUPPLIER AND MODEL	NCR 260	Okidata Corp. CP110	Okidata Corp. LP120	Olivetti TE 318/1	Printer Tech- nology Printec 100 Series
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	No No No	No No No	Yes No No	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	260-1 260-2, -5 No 260-6; 1 or 2 cassettes No	Yes No No No No	Yes No No No No	Yes Yes Yes; 8-level No None	Yes Yes No No No
Portable	260-5	No	No	No	No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No 260-6 only 256 Both in 260-6 Both No Opt.	No Std. 80/128 No Checking only No No	No Std. 132 No Checking only No No	No No — No Generation only No Std.	No Opt. 266 No Checking opt. Opt. No
<b>PRINTER CHARACTERISTICS</b> Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Non-impact Thermal; 5 x 6 dot matrix  80 10/30/15 (260-6) 94 ASCII Std. 10 3 to 6 Friction Opt. on 260-6 Std. —	Impact 5 x 7 dot matrix  80 110 64 ASCII Opt. 10 6 Friction; pin opt. No No Self test, ex- panded font	Impact 5 x 7 dot matrix  132 264 (120 lpm) 96 ASCII Std. 10 6/8 Pin (adj. tractor) No Std. Self-text, ex- panded font	Impact Full char. printing via 4 type wheels  72/80 10 64 ASCII Opt. 10 6 Friction; pin opt. No No —	Impact Full char. printing via split-helix type wheel 132 — 96/64 ASCII Std. with 96 ASCII 10; 6 (MICR) 6; 8 opt. Pin No 2-chanl.; 8-ch. opt. Tractor feed
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	57-key typewriter 128 ASCII Numeric pad std. with 260-6; char. repeat	— — —	— — —	58-key typewriter 128 ASCII Numeric pad std.	— — —
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. 80-256 on 260-6 RS-232C, CCITT, or acoustic	Simplex Asynchronous 110-9600 8-level ASCII User-specified Std. 1-80 chars. —	Simplex Asynchronous 110-9600 8-level ASCII User-specified Std. 1-132 chars. —	Half/full duplex Asynchronous 110 8-level ASCII 11 bits/char. No Char. by char. RS-232C	Half duplex Asynchronous 110-19,200 8-level 10/11 bits/char. No Char. by char. RS-232C, TTL, or 60 ma. dc current
Integral modem Telephone coupler	Opt. on 260-6 Opt.; std. on 260-5	No No	No No	No Opt.	No No
<b>PRICING AND AVAILABILITY</b> Lease price: One-year, \$ Two-year, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	75-150 70-130 1,465-5,615 May 1971 Over 8,000 NCR	— — 875-1,800 January 1975 — Third party	— — 1,600-2,800 1976 — Third party	75 (ASR) 75 (ASR) 2,330 (ASR) 1969 Over 1,000 Olivetti	RPQ only RPQ only 3,215-8,995 October 1971 Over 2,000 Sweda
<b>COMMENTS</b>		OEM only	OEM only		Printing technique developed by Printer Technology; also prints MICR E-13B font

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Qualterm QT 145 & 155	Qume Q Series & Sprint 45 & 55	Randal Data Systems LA 36	Randal Data Systems LA 180	Randal Data Systems HyTerm
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes Yes Yes	No No No	Yes No No	Yes No No	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	Yes Yes No Yes; 1 or 2 cassettes Diskette; 1 or 4	Yes No No No None	No Yes No Yes; 1 or 2 cassettes None	Yes No No No None	Yes No No Yes; 1 or 2 cassettes None
Portable	No	No	No	No	No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	Yes Std. 128 Both Selectable checking Opt. Opt.	No No No No No No No	No Std. 80 No No Opt. Opt.	No 2 std. 512 No No Opt. Opt.	No Std. 158 No Both std. Opt. No
<b>PRINTER CHARACTERISTICS</b> Type Technique	Impact Full char. printing via daisy wheel	Impact Full char. printing via daisy wheel	Impact 7 x 7 dot matrix	Impact 7 x 7 dot matrix	Impact Full char. printing via daisy wheel
Character positions per line	132/158	132/158	132	132	132
Print rate, char/second	45/55	30/45/55	30	180	10/15/30/45
Character set	94 ASCII	96 ASCII	64 ASCII	64 ASCII	96 ASCII
Lower case alphabetic	Std.	Std.	No	No	Std.
Horizontal pitch, char/inch	10/12	10/12	10	10	10/12
Vertical spacing, lines/inch	6/8	6	6	6	6/8
Forms feed	Friction; pin opt.	Friction; pin opt.	Pin	Pin	Friction; pin
Horizontal tabulation	Std.	Std.	Opt.	Opt.	Opt.
Vertical formatting	Std.	Std.	Opt.	Opt.	Opt.
Other features	Tractor feed; in- cremental plot- ting	Tractor feed; split- platen	—	—	Tractor opt.
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	65-key typewriter 128 ASCII Numeric pad std.; APL opt.	— — —	Typewriter 96 ASCII Char. repeat & break std.; numeric pad std.	— — —	58-key typewriter 96 ASCII Numeric pad std.
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110/150/300/1200 See Comments 9/10/11 bits/char. Std. Char. by char. RS-232C; 60 ma. dc current	— — — — — — — RS-232C	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C	Half/full duplex Asynchronous 300/600/1200 8-level ASCII 10/11 bits/char. Std. 1-512 chars. RS-232C	Half/full duplex Asynchronous 110/150/300/1200 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C or 20/60 ma. dc current
Integral modem	Opt.	—	No	No	No
Telephone coupler	Opt.	—	Opt.	Opt.	Opt.
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	Contact vendor Contact vendor 4,500-7,000 October 1974 Over 100 Third party	— — 1,000-2,400 1974 Over 4,000 Qume	100 84 1,910 June 1973 Over 16,000 RDS & third party Produced by Digital Equip- ment Corp.	156 (15-mo.) 119 3,085-3,885 February 1976 — RDS & third party Produced by Digital Equip- ment Corp.	Contact vendor Contact vendor 3,100; 3,200 (KSR) March 1976 — RDS & third party Produced by Diablo; diag- nostics std.; APL opt.
<b>COMMENTS</b>	Microprocessor- based; uses Qume printer mechan- ism; transmits in 8-level ASCII or 6-level PTTC/ EBCD; APL avail- able	OEM only; for bidirectional printing			

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Randal Data Systems 1552	RCA Service Co. Extel Teleprinter	RCA Service Co. Teletype 28	RCA Service Co. Teletype 33	RCA Service Co. Teletype 35
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	No Yes Yes	Yes No No	No No No	Yes No No	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	Yes Yes No Yes; 1 or 2 cassettes None	Yes No No No None	Yes Yes Yes; 5-level No None	Yes Yes Yes; 8-level No None	Yes Yes Yes; 8-level No None
Portable	No	Yes, 26 lbs.	No	No	No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No Std. 1,792 Both std. Both std. Std. No	No No — No Checking opt. Opt. Opt.	No No No Char. only No Opt. Opt.	No No — Char. only Checking opt. Opt. Opt.	No No — Char. only Checking opt. Opt. Opt.
<b>PRINTER CHARACTERISTICS</b> Type Technique	Impact Full char. printing via daisy wheel	Impact 5 x 7 dot matrix	Impact Full char. printing via type box	Impact Full char. printing via type cylinder	Impact Full char. printing via type box
Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	132 10/15/30/45 96 ASCII Std. 10/12 6/8 Friction; pin Opt. Opt. Tractor opt.	72 10/15/30 64 ASCII/Bd./TTS No 10 4/6 Friction No No —	72 10 Baudot; CCITT No 10 4/6 Friction; pin Opt. Opt. —	72/88 10/15 64 ASCII No 10/12 4/6 Friction or pin No No —	72/88 10 64 ASCII No 8/10/12 4/6 Friction or pin No Opt. —
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	55-key typewriter 96 ASCII Numeric pad std.	— — —	53-key teleprinter Baudot; CCITT Char. repeat; numeric pad opt.	53-key teleprinter 64 ASCII Char. repeat std.; numeric pad opt.	53-key teleprinter 64 ASCII Char. repeat std.; numeric pad opt.
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 300/600/1200 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C or 20/60 ma. dc current	Simplex duplex Asynchronous 110/150 8-level ASCII 7.5/8.5/10/11 bits No Char. by char. RS-232C or 20/60 ma. dc current	Half/full duplex Asynchronous 74.2 5-level Baudot 7.42/10 bits/char. No Char. by char. RS-232C: 20/60 ma. dc, or CCITT	Half/full duplex Asynchronous 110 8-level ASCII 10/11 bits/char. No Char. by char. RS-232C, 20/60 ma. dc current, or CCITT	Half/full duplex Asynchronous 110 8-level ASCII 10/11 bits/char. No Char. by char. RS-232C, 20/60 ma. dc current, or CCITT
Integral modem Telephone coupler	Opt. Opt.	Opt. Opt.	Opt. Opt.	Opt. Opt.	Opt. Opt.
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Served by	Contact vendor Contact vendor 5,500 (base) March 1975 300 RDS & third party Microprocessor- based; uses Diablo HyType I; diag- nostics std.; APL optional	55-65 — — — — RCA Service Co.	64/76/130 — — — — RCA Service Co.	43/45/59 — — — — RCA Service Co.	76/81/136 — — — — RCA Service Co.
<b>COMMENTS</b>		Made by Extel; available under 90-day lease	Made by Teletype; available under 90-day lease	Made by Teletype; available under 90-day lease	Made by Teletype; available under 90-day lease

## All About Teleprinter Terminals

SUPPLIER AND MODEL	RCA Service Co. Teletype 38	RCA Service Co. GE TerminiNet 30	Redactron Comm./Editing Typewriter	SCM-Kleinschmidt 75 Series Teleprinters	Scope Data Series 200
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No No	Yes No Yes	Yes Yes Yes	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	Yes Yes Yes; 8-level No None	No Yes No Opt. cassette None	No Yes No Yes; 1 or 2 cas- sette recorders Single or dual mag. card unit No	Yes Yes No Yes None	Yes Yes No No None
Portable	No	No	No	No	No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No No — Char. only Checking opt. Opt. Opt.	No No — Both std. Both std. Opt. Opt.	No Std. 160 Full editing Checking only No Opt.	No Yes 64 Yes, via tape Generation only Opt. Opt.	No Opt. 64; 256 No Yes Opt. No
<b>PRINTER CHARACTERISTICS</b> Type Technique	Impact Full char. printing via type cylinder	Impact 5 x 7 dot matrix	Impact Full char. printing via IBM Selectric mechanism	Impact 5 x 7 dot matrix	Non-impact Thermal printing via 7 x 9 dot matrix
Character positions per line	72/132	80	130/156	80	80/132
Print rate, char/second	10	10/20/30	14.8	30	120; 240 opt.
Character set	128 ASCII	64 ASCII	128 ASCII	64 ASCII	96 ASCII
Lower case alphabetic	Std.	No	Std.	No	Std.
Horizontal pitch, char/inch	10	10	10/12	10	10
Vertical spacing, lines/inch	4/6	6	3/4/6	6	6
Forms feed	Friction or pin	Pin (adj. tractor)	Friction and pin	Pin	Friction
Horizontal tabulation	No	No	Std.	Opt.	No
Vertical formatting	No	Std.	Opt.	Opt.	No
Other features	—	Ribbon cartridge	—	Baudot, APL option	Special char. sets
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	53-key teleprinter 128 ASCII Char. repeat and numeric pad opt.	63-key typewriter 64 ASCII Char. repeat	58-key typewriter 128 ASCII —	53-key typewriter 128 ASCII Character repeat std.	58-key typewriter 128 ASCII Character repeat std.
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110 8-level ASCII 10/11 bits/char. No Char. by char. RS-232C or 20/60 ma. dc current	Half/full duplex Asynchronous 100/200/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C	Half/full duplex Asynchronous 110-134.5 See Comments 8/9/10 bits/char. Opt. Variable RS-232C or 20/60 ma. dc current	Half/full duplex Asynchronous 50 to 300 8-level ASCII 10 bits/char. Std. Char. by char. RS-232C	Half/full duplex Asynchronous 75 to 2400 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C, 20/60 ma. dc current
Integral modem	Opt.	Opt.	Std.	No	No
Telephone coupler	Opt.	Opt.	No	No	Opt.
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	56/65/81 — — — — RCA Service Co.	90-145 — — — — RCA Service Co.	184-364 184-364 7,295-11,123 — — Redactron	— — \$1,750(KSR) June 1974 210 Combination	Contact vendor Contact vendor 1,895-2,800 August 1974 — Sorbus, Inc.
<b>COMMENTS</b>	Made by Teletype; available under 90-day lease		Designed for word processing applica- tions; uses ASCII or Correspondence code	RO model is priced at \$1,500	

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Selecterm 33 ASR Data Terminal	Selecterm Execuport 300	Selecterm System 75	Selecterm Beta	Selecterm LA 36 DECwriter II
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No No	Yes No No	Yes No No	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	No Yes Yes; 8-level Yes; cassette None	No Yes No Yes; cassette None	Yes Yes No Yes; cassette None	No Yes Yes; 8-level Yes; cassette None	No Yes No No None
Portable	No	Yes; 29 lbs.	No; mobile	No	No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No No — With cassette Generation only Opt. Opt.	No No — With cassette Generation only No Opt.	Format only Yes 200 With cassette Both std. No Opt.	No No — With cassette Both std. Opt. Opt.	No No — No No No No
<b>PRINTER CHARACTERISTICS</b> Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Impact Full char. printing via type cylinder  72 10 64 ASCII No 10 3/6 Friction; pin opt. No No None	Non-impact 5 x 7 dot matrix via thermal method 80 10/15/30 96 ASCII Std. 10 6 Friction No No None	Impact Full char. printing via daisy wheel 132/158 10/15/30 94 ASCII Std. 10/12 6/8 Pin Std. Std. Tractor feed, 2-color ribbon, plotting (2880 psi)	Impact Full char. printing via helical type wheel 132 10/15/30 64 ASCII No 10 6 Pin No No —	Impact 7 x 7 dot matrix  132 10/15/30 96 ASCII Std. 10 6 Pin No No Tractor feed
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	53-key typewriter 64 ASCII Char. repeat	58-key typewriter 128 ASCII Char. repeat; numeric pad std.	65-key typewriter 94 ASCII Char. repeat; numeric pad std.	Typewriter 128 ASCII —	58-key typewriter 128 ASCII Numeric pad opt.
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110 8-level ASCII 11 bits/char. No Char. by char. 20/60 ma. dc current	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C	Half/full duplex Asynchronous 110/150/300/1200 8-level ASCII 10/11 bits/char. Std. 200 char. RS-232C; current loop opt.	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C, 20/60 ma. dc current, or CCITT
Integral modem Telephone coupler	No Opt.	Std. Std.	Opt. Opt.	No Opt.	No No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Served by	55 — 1,427 — — Selecterm	135 — 3,895-3,225 January 1968 4,000 Selecterm	200 — 5,400 May 1974 — Selecterm	120-205 — 1,400-2,200 July 1970 — Selecterm	90 — 1,795 — — Selecterm
<b>COMMENTS</b>	Manufactured by Teletype Corp. as the Teletype 33 ASR	Manufactured by Computer Trans- ceiver Systems as the Execuport 300	Employs Intel 8008 micropro- cessor and Diablo HyType printer mechanism	Employs UNIVAC DCT 500 printer mechanism	Produced by Digital Equip- ment Corp.

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Teletype Model 33	Teletype Model 35	Teletype Model 40 ROP	Terminal Communications TC-241	Texas Instruments Model 732
COMPATIBILITY Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No No	Opt. No No	No Yes No	Teletype 28/32 No No
MODEL CONFIGURATIONS Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	Yes Yes Yes; 8-level Yes; cartridge None	Yes Yes Yes; 8-level Yes; cartridge None	Yes No No No CRT display and keyboard No	Yes (TC 240) Yes No No None	Yes Yes No Yes; 1 or 2 cas- sette recorders None
Portable	No	No	No	No	No
TERMINAL FEATURES Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No No — No Gen.std.; chk.opt. Opt. Std.	No No — No Gen.std.; chk.opt. Opt. Std.	No 2 std. 1000 No Checking only Opt. Std.	No Std. 511; 2,047 opt. Both std. Std. Std. Std.	No No — Both; ASR only Generation only No Opt.
PRINTER CHARACTERISTICS Type Technique	Impact Full char. printing via rotating type cylinder	Impact Full char. printing via moving type box	Impact Full char. printing via type belt & multiple actuators	Impact Full char. printing via type wheel	Non-impact Thermal; 5 x 7 dot matrix
Character positions per line	72	72	80/132	132/158	80
Print rate, char/second	10	10	296-660	30	6.7/10/13.3
Character set	64 ASCII	64 ASCII	64/96 ASCII	96 ASCII	57 Baudot
Lower case alphabetic	No	No	Opt.	Std.	No
Horizontal pitch, char/inch	10	10	10	10/12	10
Vertical spacing, lines/inch	6/3	6/3	6/3	6/8	6/3
Forms feed	Friction or pin	Friction or pin	Friction; pin	Friction; pin opt.	Friction
Horizontal tabulation	No	Std.	Opt.	Std.	No
Vertical formatting	No	Vert. tab std.	Opt.	Std.	No
Other features	Prints lower-case alphabets as upper-case	Prints lower-case alphabets as upper-case	Tractor feed	Auto blank sup- press; tractor feed, extra 2K buffer	—
KEYBOARD CHARACTERISTICS Keyboard arrangement Character set Features	53-key teleprinter 64 ASCII Char. repeat	50-key teleprinter 64 ASCII Char. repeat	— — —	77-key typewriter Several Character repeat	32-key typewriter 57 Baudot Character repeat std.
TRANSMISSION Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110 8-level ASCII 11 bits/char. No Char. by char. RS-232C or 20/60 ma. dc current	Half/full duplex Asynchronous 110 8-level ASCII 11 bits/char. No Char. by char. RS-232C or 20/60 ma. dc current	Half duplex Asynchronous — 8-level ASCII 10 bits/char. No Char. by char. RS-232C or dc current loop	Half duplex Asynchronous 75-180 6-level BCD 9 bits/char. No Variable RS-232C	Half/full duplex Asynchronous 50/75/100 5-level Baudot 9 bits/char. Std. Char. by char. RS-232C; 20/60 ma. dc current opt. Opt. No
Integral modem Telephone coupler	Opt. No	Opt. No	No No	Opt. No	Opt. No
PRICING AND AVAILABILITY Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	Purchase only 619-1,445 1962 — Teletype	Purchase only — 1,924-4,500 1962 — Teletype	Purchase only — 2,974-3,203 1973 — Teletype	185-229 175-211 5,700-6,570 4th qtr. 1973 2,300 TCI	80-146 70-136 1,670-3,240 January 1973 — TI
COMMENTS	Standard-duty unit; also available from third-party lessors; see Report 70D-830-01 for details	Heavy-duty unit; also available from third-party lessors; see Report 70D-830-02 for details	Hard-copy output unit for Teletype's new Model 40 display system; see Report 70D- 830-06 for de- tails	Microprogrammed; three switch- selectable program- mable formats—2 fixed, 1 variable	



## All About Teleprinter Terminals

SUPPLIER AND MODEL	Texas Instruments Model 733	Texas Instruments Model 735	Texas Instruments Model 742	Texas Instruments Model 743	Texas Instruments Model 745
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	No No No	No No No	Yes No No	Yes No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	Yes Yes No Yes; 1 or 2 cassette recorders None	No Yes No No None	No No No Yes; 2 cassette recorders None	No Yes No; RS-232 No; RS-232 None	No Yes No No None
Portable	No	Yes; 25 lbs.	No	No	Yes; 13 lbs.
<b>TERMINAL FEATURES</b> Programmable Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No No — Both; ASR only Generation only No Opt.	No No — No Generation only No No	Yes Std. 425 Both std. Both std. Std. Std.	No Std. 8 No Generation only No No	No Std. 8 No Generation only No No
<b>PRINTER CHARACTERISTICS</b> Type Technique	Non-impact Thermal; 5 x 7 dot matrix	Non-impact Thermal; 5 x 7 dot matrix	Non-impact Thermal; 5 x 7 dot matrix	Non-impact Thermal; 5 x 7 dot matrix	Non-impact Thermal; 5 x 7 dot matrix
Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	80 10/15/30 96 ASCII Opt. 10 6/3 Friction No No —	80 10/15/30 95 ASCII Std. 10 6/3 Friction No No —	80 10/15/30 95 ASCII No 10 6/3 Friction No No —	80 10/30 64 ASCII No 10 6 Friction No No —	80 10/30 64 ASCII No 10 6 Friction No No —
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	55-key typewriter 102/128 ASCII Character repeat std.	61-key typewriter 128 ASCII Character repeat Std.	57-key data entry 96 ASCII Char. repeat, numeric pad	Typewriter 96 ASCII Char. repeat, numeric pad	Typewriter 96 ASCII Char. repeat, numeric pad
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C; 20/60	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. Acoustic	Half/full duplex Asynchronous 110/150/300/1200 8-level ASCII 10/11 bits/char. Std. 1 or 425 char. RS-232C	Half/full duplex Asynchronous 110/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C or 20/60 ma. dc current Opt. No	Half/full duplex Asynchronous 110/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C
Integral modem Telephone coupler	Opt. Yes	No Std.	Opt. No	Opt. No	No Std.
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	85-183 75-173 1,595-4,275 January 1973 — TI	135 125 2,295 September 1974 — TI	205-230 195-220 4,925-5,520 September 1974 — TI	85-93 75-83 1,395-1,590 January 1976 — TI	125 115 1,995 January 1976 — TI
<b>COMMENTS</b>	120 bps transmission speed is optional		See Report 70D-840-04 for details	Microprocessor based (TMS 8080) unit, can print continuously at 30 cps	Microprocessor based portable unit

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Texas Instruments Model 754 RO	Texas Instruments Model 755 RO	Trans-Lux Teleprinter	Trendata Models 900, 1000, 1500, and 2000	Trendata Model 4000
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No No	No No No	No 2740-1 Yes	Yes Yes Yes
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	Yes No No No None	Yes No No No None	No Yes No No None	No Yes No Yes; cassette re- corder Mdl 1500 None	Yes Yes No No None
Portable	No	No	No (32 lbs.)	No	No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No No — No No No No	No No — No No No No	No Yes 2048 Both std. No Std. Std.	No No — Both; Mdl. 1500 Both; all models Mdl. 2000 only Opt.	No Yes 132 No Selectable Yes Opt.
<b>PRINTER CHARACTERISTICS</b> Type Technique	Non-impact Thermal; 5 x 7 dot matrix	Non-impact Thermal; 5 x 7 dot matrix	Impact 5 x 7 dot matrix	Impact Full char. printing via IBM Selectric mechanism	Impact Full char. printing via daisy wheel
Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	80 6.7/10/13.3 57 Baudot Std. 10 6/3 Friction No No —	80 10/15/30 95 ASCII Std. 10 6/3 Friction No No —	69 6.6/13.3 57 Baudot No 10 4.25 Friction No No —	130/156 15 96 EBCDIC Std. 10/12 6 Friction/pin Std. No —	132/158 30 96/128 ASCII Std. 10/12 6/8 Friction; pin opt. Std. Opt. Reverse tab; trac- tor feed; inter- changeable fonts
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	— — —	— — —	Typewriter 64 Baudot Char. repeat std.	Typewriter Corr./BCD Char. repeat std.	Typewriter 128 ASCII Numeric pad
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Simplex Asynchronous 50/75/100 5-level Baudot 7.5 bits/char. Std. Char. by char. RS-232C; 20/60 ma. dc current; parallel No No	Simplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C; 20/60 ma. dc current; parallel No No	Half duplex Asynchronous 66 wpm 5-level Baudot 7 bits/char. Automatic Char. by char. RS-232C	Half/full duplex Asynchronous 14.8-270 6-level Corr./BCD 9 bits/char. Std. some mdls. Char. by char. RS-232C	Half/full duplex Asynchronous 110/150/300 See Comments 10/11 bits/char. Std. Char. by char. RS-232C; 20/60 ma. dc current
Integral modem Telephone coupler	No No	No No	No No	Opt. Opt.	Opt. Opt.
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	Contact vendor Contact vendor 1,610 September 1974 — TI	Contact vendor Contact vendor 1,510 September 1974 — TI	67 65 2,195 December 1974 — Trans-Lux	95-252 88-237 2,990-7,350 1971 2,500 Trendata & third party	180-274 165-264 5,150-8,169 January 1975 600 Trendata
<b>COMMENTS</b>			Designed for use on W. U. Telex Network; can be used on leased facilities		Microprocessor- based; transmis- sion codes can be specified as ASCII, PTTC/ BCD, and Corre- spondence

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Trendata Trendwriter	Tycom 38	Tycom 35/37	UNIVAC DCT 475 & DCT 500	UNIVAC DCT 1000
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No No	Yes No 37 opt.	Yes No No	No No No
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices	No Yes Yes Yes; 1 or 2 cassettes None	No Yes No Yes None	No Yes 35 opt. 37 opt. Yes; diskette on 37 No	DCT 500 only DCT 475/500 DCT 500 only; 5- to 8-level No No	Yes Yes Yes; 5- to 8-level No Card reader, key- punch(1701/1710) No
Portable	No	Yes; 55 lbs.	No	No	No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No Std. 16 No Both std. Opt. No	No Std. 32 No Std. Opt. Opt.	No Std. 32 37 only Std. Opt. Opt.	No No — Char. only Both Opt. Opt.	No Yes, 2 160 each Char. only Both Opt. Yes
<b>PRINTER CHARACTERISTICS</b> Type Technique	Impact 7 x 7 dot matrix	Impact Full char. printing via IBM Selectric mechanism	Impact Full char. printing via IBM Selectric mechanism	Impact Full char. printing via rotating helical type wheel	Impact Full char. printing via rotating helical type wheel
Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/line Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	132 10/15/30 96 ASCII Std. 10/16.5 6 Pin (adj. tractor) Opt. Opt. Opt. switch- selectable APL	132/156 10 88 Std. 10/12 6/8 Friction or pin Opt. No Upper case only; auto CR	132/156 10/15 88 Std. 10/12 6/8 Friction or pin Opt. 37 opt. 120 cps via mag- netic tape	132 10/15/30 (DCT 500) 63 ASCII No 10 6 Pin No No —	132 10/15/30 63 ASCII No 10 6 Pin Opt. Opt. —
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	Typewriter 128 ASCII Numeric pad opt.	53-key typewriter 88 None	53-key typewriter 88 None	Typewriter 128 ASCII Three keyboards avail. for ASCII, EBCDIC, or A/H	Typewriter 128 ASCII —
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. 20/60 ma. dc or opt. RS-232C	Half duplex Asynchronous 110 8-level ASCII 10/11 bits/char. No Char. by char. RS-232, 20/60 ma. dc current	Half duplex Asynchronous 110/150/300/1200 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232, 20/60 ma. dc current	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. (DCT 500) Char. by char. RS-232C	Half/full duplex Asynchronous 300-4800 8-level ASCII 8/10 bits/char. No 160 chars. RS-232C
Integral modem Telephone coupler	No Opt. (external)	Std. Std.	Std. Std.	Opt. No	No No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	97 90 2,350 January 1976 — Trendata & third party Microprocessor- based unit uses DECwriter mechan- ism	100 72 2,350 January 1971 — Tycom	150 (35); 125 (37) 125-175 2,950-4,550 January 1975 — Tycom	85-253 — 2,592-7,720 July 1970 — UNIVAC	185-742 — 6,400-27,745 May 1971 — UNIVAC
<b>COMMENTS</b>		Tycom provides applique for customer- supplied IBM Selectric typewriter; offers quantity discounts; options in- clude APL type ball, 2K-16K memory, and 1200 bps transmission		DCT 475 speed is fixed at 10 cps (110 bps); see Report 70D-877-Q2 for details	See Report 70D-877-03 for details

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Victor Comptometer 5000 Series	Western Union Data Services EDT 33	Western Union Data Services EDT 35	Western Union Data Services EDT 300	Western Union Data Services EDT 1200
COMPATIBILITY Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No No	Yes No No	Yes No No	Yes No No
MODEL CONFIGURATIONS Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices  Portable	Yes No No No None No	No Yes Yes; 8-level Yes; cartridge None No	No Yes Yes; 8-level No None No	No Yes Yes Yes; cassette None No	No Yes No Yes; cassette None No
TERMINAL FEATURES Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or character Parity checking/generation Polling/Addressing capability Automatic answer	No Yes 68 No Checking only No No	No No — Char. only Gen. std. No Opt.	No No — Char. only Gen. std. No Opt.	No No — Char. only Gen.std.; chk.opt. No Opt.	No No Char. only Char. only Gen.std.; chk.opt. No Opt.
PRINTER CHARACTERISTICS Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Impact 5 x 7 dot matrix  34 110 64 ASCII No 11 6 Friction; in opt. No No Prints uppercase equiv. of lower- case alpha	Impact Full char. printing via rotating type cylinder 72 10 64 ASCII No 10 6/3 Friction or pin No No —	Impact Full char. printing via moving type box 72 10 64 ASCII No 10 6/3 Friction or pin Opt. Yes —	Impact Full char. printing via actuator per char. position 75/118 10/15/30 96 ASCII Std. 10 6/3 Friction or pin Opt. Yes —	Impact Full char. printing via actuator per char. position 80/120 10/30/120 94 ASCII Std. 10 6/3 Pin Opt. Std. Tractor feed
KEYBOARD CHARACTERISTICS Keyboard arrangement Character set Features	— — —	53-key teleprinter 128 ASCII Character repeat std.; numeric pad opt.	55-key teleprinter 128 ASCII Character repeat std.; numeric pad opt.	53-key teleprinter 128 ASCII Character repeat std.; numeric pad opt.	62-key teleprinter 128 ASCII Character repeat; numeric pad opt.
TRANSMISSION Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface  Integral modem Telephone coupler	Half duplex Asynchronous 110-9600 8-level ASCII 10/11 bits/char. No — RS-232C, 20/60 ma. dc current  No No	Half/full duplex Asynchronous 110 8-level ASCII 11 bits/char. No Char. by char. RS-232C, 20 ma. dc current  Opt. Opt.	Half/full duplex Asynchronous 110 8-level ASCII 11 bits/char. No Char. by char. RS-232C, 20 ma. dc current  Opt. No	Half/full duplex Asynchronous 110/150/300 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C  Opt. Opt.	Half/full duplex Asynchronous 100/300/1200 8-level ASCII 10/11 bits/char. Std. Char. by char. RS-232C  Opt. No
PRICING AND AVAILABILITY Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Serviced by	Purchase only — See Comments April 1974 — Victor	49 (KSR); 60 (ASR) — — October 1970 8,573 WU Data Services	84 (KSR); 118 (ASR) — — October 1970 994 WU Data Services	115 (KSR); 215 (ASR) — — May 1972 3,959 WU Data Services	171 (KSR); 241 (MSR) — — May 1973 291 WU Data Services
COMMENTS	Microprocessor- based; \$1,195 in unit quantities to \$777 in quantities of 500 units	Teletype Model 33; \$57/mo. (KSR), \$63/mo. (ASR), \$138/mo. (MSR/ KSR), or \$144/ mo. (MSR/ASR) on 90-day lease	Teletype Model 35; available under 90- day lease for \$89/ mo. (KSR) or \$125/mo. (ASR)	Also available under 90-day lease for \$130/mo. (KSR), \$235/mo. (ASR), \$211/mo. (MSR/ KSR), or \$316/mo. (MSR/ASR)	Also available under 90-day lease for \$191 (KSR) or \$266 (MSR)

## All About Teleprinter Terminals

SUPPLIER AND MODEL	Witek 300	Witek 350	Witek 400 and 450	Witek Witek II
<b>COMPATIBILITY</b> Teletype 33/35 IBM 2740-1/2740-2 IBM 2741	Yes No No	Yes No No	Yes No No	Yes Opt. Opt.
<b>MODEL CONFIGURATIONS</b> Printer only (RO) Keyboard and printer (KSR) Keyboard, printer, and punched tape reader/punch (ASR) Keyboard, printer, and magnetic tape recorder (ASR) Other devices  Portable	No Yes Yes; 8-level No None No	No Yes Yes; 8-level No None No	No Yes No No None No	Yes Yes Yes; 5-8 level No Diskette & other devices No
<b>TERMINAL FEATURES</b> Programmable by user Internal buffer Internal buffer capacity, chars. Editing, line and/or char. Parity checking/generation Polling/Addressing capability Automatic answer	No Yes (mag. tape) 50K bytes Both Both Std. Std.	No Yes (mag. tape) 50K bytes Both Both Std. Std.	No Yes (mag. tape) 50K bytes Both Both Std. Std.	Yes Yes 64K bytes Std. Both std. Std. Std.
<b>PRINTER CHARACTERISTICS</b> Type Technique  Character positions per line Print rate, char/second Character set Lower case alphabetic Horizontal pitch, char/inch Vertical spacing, lines/inch Forms feed Horizontal tabulation Vertical formatting Other features	Impact Full char. printing via rotating type cylinder  72 10 64 ASCII No 10 6/3 Friction or pin Opt. Opt. —	Impact Full char. printing via moving type box  72 10 64 ASCII No 10 6/3 Friction or pin Std. Vert. tab std. —	Impact Full char. printing  75/80/118 10/15/30 94 ASCII Std. 10 6/3 Pin Opt. Vert. tab std. Tractor feed	Impact —  132 300 lpm Variable Std. Variable Variable Friction or pin Yes Yes —
<b>KEYBOARD CHARACTERISTICS</b> Keyboard arrangement Character set Features	53-key teleprinter 64 ASCII Character repeat std.	50-key teleprinter 64 ASCII —	Typewriter 128 ASCII Character repeat	Typewriter Varies Character repeat, numeric pad
<b>TRANSMISSION</b> Mode Technique Speed, bits/second Code Unit code structure Operator selectable speeds Format Communications interface	Half/full duplex Asynchronous 1200; 2400 opt. 8-level ASCII 11 bits/char. No 160/360 chars. RS-232C or CCITT	Half/full duplex Asynchronous 1200; 2400 opt. 8-level ASCII 11 bits/char. No 160/360 chars. RS-232C or CCITT	Half/full duplex Asynchronous 1200; 2400 opt. 8-level ASCII 10 bits/char. Std. 160/360 chars. RS-232C or CCITT	Half/full duplex Async./Sync. Up to 9600 Any 5-8 level — Opt. Variable RS-232C, 60 ma. dc current, CCITT
Integral modem Telephone coupler	Std. No	Std. No	Std. No	Std. No
<b>PRICING AND AVAILABILITY</b> Lease price: One year lease, \$ Two year lease, \$ Purchase price, \$ Date of first production delivery Terminals installed to date Served by	Not specified Not specified Not specified — — Witek	Not specified Not specified Not specified — — Witek	Not specified Not specified Not specified — — Witek	Not specified Not specified Not specified February 1976 — Witek
<b>COMMENTS</b>	Uses Teletype 33 tele- printer, BSC line disci- pline, and endless-loop mag. tape buffer; see Report 70D-918-01 for details	Uses Teletype 35 tele- printer, BSC line disci- pline, and endless-loop mag. tape buffer; see Report 70D-918-01 for details	Uses GE TerminiNet 300, BSC line discipline, and endless-loop magnetic tape buffer	Minicomputer based terminal designed for a wide range of appli- cations

AN EXTRACT FROM

## A COMPARATIVE TIME-SHARING COST ANALYSIS REPORT

BY

REAL DECISIONS CORPORATION

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**The Association of  
Time-Sharing Users**

210 Fifth Avenue, New York, NY 10010

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AN EXTRACT FROM  
A COMPARATIVE TIME SHARING COST ANALYSIS REPORT

February, 1976

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## PREFACE

This Extract has been taken from the report entitled A Comparative Time Sharing Cost Analysis Report published by Real Decisions Corporation in August, 1975. RDC has used its best efforts to ensure the accuracy of the information contained herein. The processes described in this Extract should be viewed as only one factor in evaluating any given vendor's capabilities. Vendors included in this Extract are:

<u>VENDOR NAME</u>	<u>LOCATION</u>	<u>HARDWARE</u>
BCS Boeing Computer Services, Inc.	Seattle, Wash.	CDC
C-S Comshare, Inc.	Ann Arbor, Mich.	Xerox
CSC Computer Sciences Corp.	El Segundo, Calif.	Univac
* CSV Compu-Serv	Columbus, Ohio	DEC
CDC Control Data Corp.	Minneapolis, Minn.	CDC
CYP Cyphernetics Corp.	Ann Arbor, Mich.	DEC
GE General Electric	Bethesda, Md.	Honeywell
GDS Grumman Data Systems Corp.	Woodbury, N.Y.	Honeywell
MCA McDonnell Douglas Automation Co.	St. Louis, Mo.	Xerox
NCS National CSS, Inc.	Norwalk, Conn.	IBM
OLS On-Line Systems	Pittsburgh, Pa.	DEC
* RAP Rapidata, Inc.	Fairfield, N.J.	DEC
SBC Service Bureau Co.	Greenwich, Conn.	IBM
TYM Tymshare, Inc.	Cupertino, Calif.	DEC
UCS United Computing Systems, Inc.	Kansas City, Mo.	CDC

\* Not included in original report.

## INTRODUCTION

The primary purpose of this report is to understand the effective cost of running two (2) standardized programs on various time sharing services. The intent, therefore, is to provide insight into the pricing methods of selected time sharing vendors. RDC designed and wrote a series of programs which utilized comparable resources on all the vendors. Costs were then calculated for CPU, I/O, connect and storage resources. These cost analysis runs illustrate the effects of vendors' pricing structures and algorithms for the two (2) particular programs.

The two (2) programs used in this Extract perform exactly the same logic and computations. However, one (1) program is written in FORTRAN and the other in BASIC. The type of run is a CPU intensive exercise. It performs a series of computations N times and stores N numbers in core, thereby allowing us to test the CPU billing algorithms of the vendors for the effect of core utilization and time.

One of the basic premises underlying the cost analysis effort was to standardize the programs as much as possible for all vendors. Therefore, our objective was to force each system to perform in a simple straight-forward manner. Many vendors offer optimized versions of the languages utilized in our tests. We were not after the most efficient way to run a particular program; rather, our interest was to compare the effects of different pricing structures on common resource utilizations. If one vendor's system required more CPU resources than another for a particular program, yet the prices are the same, we feel that is a meaningful statistic. The user of this report should

not therefore conclude that any one program represents the best result possible for any particular vendor. One can, however, analyze such results and understand a great deal about the operating characteristics as well as the price performance capabilities of the vendors we analyzed.

Real Decisions Corporation does not represent that the results from this series of cost analysis runs are conclusive proof of any particular vendor's total price performance capabilities. There are significant price performance differences between the vendors analyzed. To more accurately test specific requirements, users should perform custom benchmarks and evaluate other pertinent factors.

In addition, RDC does not represent that the vendors included comprise a comprehensive list of all time sharing vendors. In all cases except for the GE FORTRAN runs, RDC controlled the operations of the terminals and monitored the results.

### THE ANALYSIS

The following chart presents the CPU, Connect, and Storage charges for each vendor. In addition, actual CPU units used for the two (2) runs are shown for each vendor. Finally, the actual connect times in seconds are shown. These analysis runs were made in the summer and fall of 1975. All prices used were standard retail rates in effect for the vendors at the time runs were made, except that the prices used for NCSS's BASIC run are effective as of October 1, 1975. NCSS lowered its prices for all BASIC runs by dividing VPU's used by two (2). Many vendors offer significant discounts for large amounts of on-line disk storage. Some vendors use different classifications of disk storage which in effect can lower a user's storage charges. Prices used by RDC are for a small user or the first level of disk storage charges on a vendor's price list.

On the following chart the FORTRAN run is coded A1 and the BASIC run is coded B2.

### THE ANALYSIS

The following chart presents the CPU, Connect, and Storage charges for each vendor. In addition, actual CPU units used for the two (2) runs are shown for each vendor. Finally, the actual connect times in seconds are shown. These analysis runs were made in the summer and fall of 1975. All prices used were standard retail rates in effect for the vendors at the time runs were made, except that the prices used for NCSS's BASIC run are effective as of October 1, 1975. NCSS lowered its prices for all BASIC runs by dividing VPU's used by two (2). Many vendors offer significant discounts for large amounts of on-line disk storage. Some vendors use different classifications of disk storage which in effect can lower a user's storage charges. Prices used by RDC are for a small user or the first level of disk storage charges on a vendor's price list.

On the following chart the FORTRAN run is coded A1 and the BASIC run is coded B2.



COST AND UNITS USED CHART FOR  
CPU, CONNECT AND STORAGE

Vendor	CPU Charges	CPU Units Used		Connect Cost/hour	Connect Time in Seconds		Storage Costs 1000 char/mo.
		A1	B2		A1	B2	
BCS	\$2.50/CCU Comp.Chg.Unit	.415	.253	\$ 8.00	13	15	\$.2109
C-S	.07/CCU C-S Comp.Unit	43	20	7.20	15	13	.1464
CSC	.26/SRU Sys.Res.Unit	7.5	4.4	11.00	19	12	.3809
CSV	.02/SRU Sys.Res.Unit	81	61	10.00	11	10	.5156
CDC	.30/ARU Appl.Res.Unit	5.994	3.656	9.00	33	25	.3750
CYP	.02/CRU Comp.Res.Unit	135	166	10.00	18	13	1.0000
GE	.10/CRU Comp.Res.Unit	23.18	24.43	10.00	17	16	.1563
GDS	.165/Sec.* Second	10.677	7.284	6.00	21	17	.5000
MCA	.22/MRU Main Res.Unit	3.479	6.907	10.00	13	16	.5078
NCS	.20/VPU * Vir.Proc.Unit	12.891	20.084	10.00	15	19	.1833
OLS	.05/CPU Core Proc.Unit	35	31	10.00	18	15	.4688
RAP	.06/CPU Comp.Proc.Unit	23.0	19.7	11.00	13	9	.6000
SBC	.16/PU Process Unit	27	18	11.00	16	23	.6176
TYM	.12/TRU Tym.Res.Unit	9.90	7.88	10.00	20	15	.5000
UCS	.025/CU * Core Usage	1.489	1.227	10.50	17	16	.2441

\* In addition, I/O units are charged for disk  
and/or other resource access.

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### THE ANALYSIS (cont.)

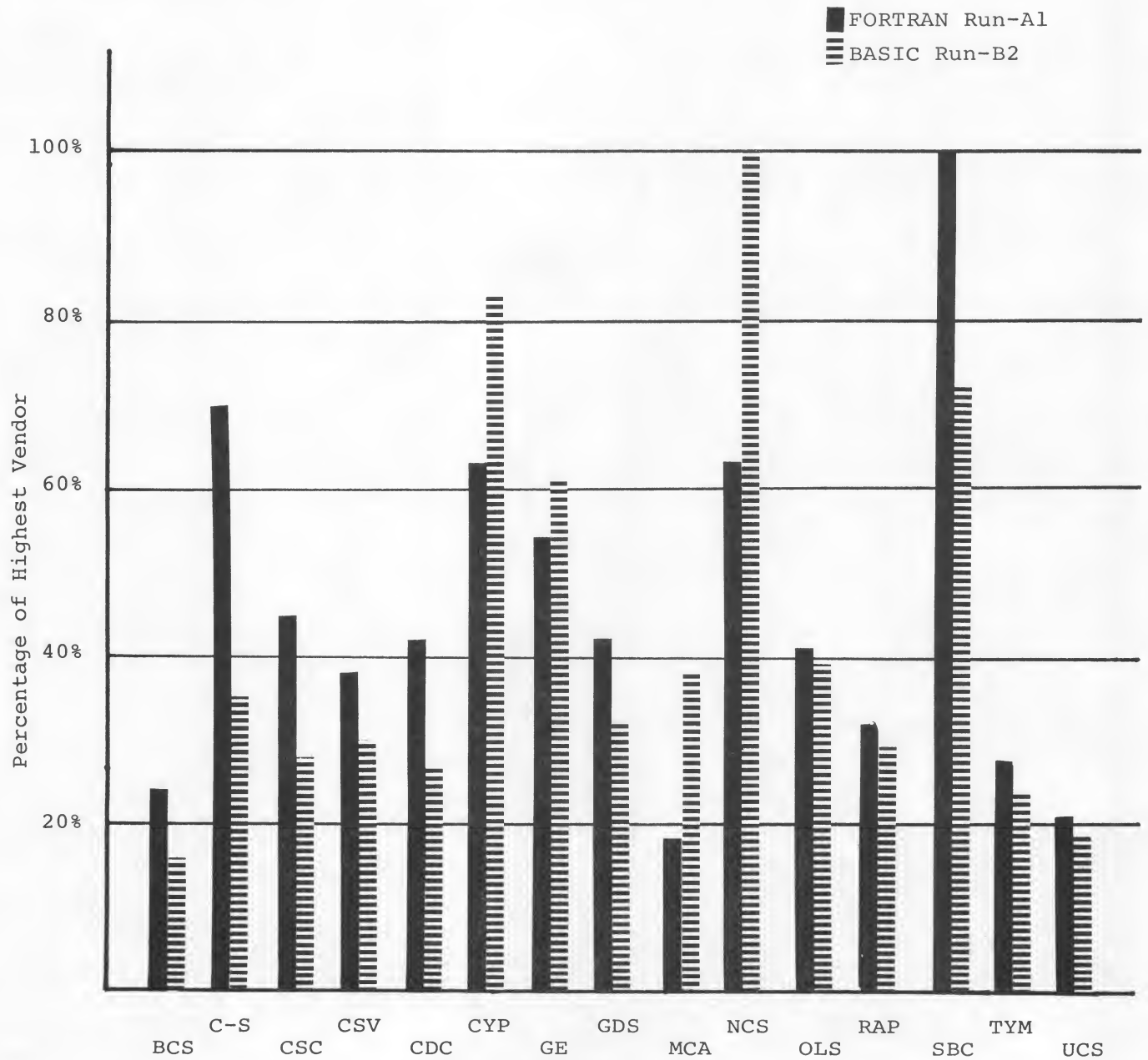
The following chart and graph present the CPU cost extensions for each vendor and each run. For each run we determined the highest price/performance vendor, then calculated the percentage that each of the other vendor's CPU costs represent of the highest vendor's CPU costs. In this way one can see the dramatic differences that exist between the various vendors for the same job. Because the programs are the same except one is coded in FORTRAN and the other in BASIC, one can see the comparative efficiency of running in either FORTRAN or BASIC for each vendor. For the purposes of this summary, the following observations are pertinent:

- o The ratio of highest to lowest vendor on the FORTRAN run is greater than 5:1.
- o The ratio of the second highest to second lowest vendor on the FORTRAN run is greater than 3:1.
- o Eleven (11) of the fifteen (15) vendors ran the problem coded in BASIC at less cost than the FORTRAN version.
- o The ratios of highest to lowest and second highest to second lowest vendors on the BASIC run is 6.3:1 and 4.4:1 respectively.

CPU COST CHART

Vendor	FORTTRAN CPU Costs	Run A1 % of Highest Vendor	BASIC Run B2 CPU Costs	% of Highest Vendor
BCS	\$1.04	24%	\$ .63	16%
C-S	3.01	70	1.40	35
CSC	1.95	45	1.14	28
CSV	1.62	38	1.22	30
CDC	1.80	42	1.10	27
CYP	2.70	63	3.32	83
GE	2.32	54	2.44	61
GDS	1.83	42	1.27	32
MCA	.77	18	1.52	38
NCS	2.72	63	4.02	100
OLS	1.75	41	1.55	39
RAP	1.38	32	1.18	29
SBC	4.32	100	2.88	72
TYM	1.19	28	.95	24
UCS	.92	21	.78	19

CPU COST COMPARISON GRAPH



This Extract only deals with the CPU costs for comparison purposes. Obviously, one must look at Connect, I/O and Storage charges as well. The report from which this Extract is taken attempts to present these charges in various combinations for each vendor in such a way as to illustrate total costs and CPU costs. The effect of adding these charges to CPU costs changes (in some cases, dramatically) the relationships between vendors in terms of price/performance results. Interested parties may purchase A Comparative Time Sharing Cost Analysis Report for \$600.00 by sending a letter or purchase order to:

Real Decisions Corporation  
270 Greenwich Avenue  
Greenwich, Connecticut 06830.



**The Association of Time-Sharing Users**

210 Fifth Avenue, New York, NY 10010

Telephone: (212) 889-4433

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**GUIDE-LINES FOR ATSU's COMPLIANCE  
WITH THE FEDERAL ANTI-TRUST LAWS**

PREPARED BY

MARTIN J. NEVILLE, ESQ.

BURNS, VAN KIRK, GREENE & KAER



BURNS, VAN KIRK, GREENE & KAER

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BERNARD M. ALTHOFF  
LAWRENCE P. J. BONAGUIDI  
JOSEPH W. BURNS  
DONALD E. BYRNE  
WILLIAM D. GREENE  
DONALD C. HAIN  
HOWARD G. KAER  
JOHN P. KEEGAN  
ALAN PALWICK  
BLACKWELL SMITH  
THOMAS J. UNGERLAND  
W. PHILIP VAN KIRK

OSCAR J. HEIG  
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PAUL J. CHRISTIANSEN  
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STEPHEN VASAK, JR.

OF COUNSEL  
PAUL N. STERNBACH  
HERBERT J. SEAKWOOD

March 18, 1975

Mr. Hillel Segal  
Executive Director  
The Association of Time-Sharing  
Users  
c/o The Hertz Corporation  
660 Madison Avenue  
New York, New York 10021

Re: Compliance by ATSU and its members with  
the Federal Antitrust Laws

Dear Hillel:

You have requested guidance relating to ATSU for compliance with the federal antitrust laws and as to activities that are prohibited by these laws. The antitrust law applicable to trade association activities is principally Section 1 of the Sherman Act which has been interpreted to prohibit agreements, combinations and conspiracies in restraint of trade that involve price-fixing, bid rigging, horizontal and vertical territorial or customer allocation, boycotts, and other activities such as "tie-in sales."

The purposes of ATSU as spelled out in its Certificate of Incorporation are as follows:

"(a) To act as a non-profit independent computer time-sharing user association, representing the needs of its members and promoting the free interchange of ideas about time-sharing products and services.

(b) To promote the use of computer time-sharing for improved decision making and to encourage continuous improvement in the efficiency and capability of time-sharing products and services. Also, to encourage an increase in the range of products and services available to individual computer time-sharing users.

Mr. Hillel Segal

March 18, 1975

(c) To act as a clearing house and publisher of information about time-sharing products and services."

The very nature of trade association activities is such that they must be subject to a continuing review by counsel for evaluation of their legality. The purposes of ATSU stated above are lawful, but care must constantly be exercised to make sure that the activities engaged in do not create antitrust problems. The purpose of the activity is not the determinant of antitrust legality, rather the effect of such activity is frequently the measure by which the activity is judged under the antitrust laws.

To provide the Association, its Chapters and Special Interest Groups with some preliminary guidance as to areas of activities or kinds of activities that fall within the umbrella of actions that have been determined to constitute violations of the federal antitrust laws, the following are two principal kinds of activities that are prohibited.

1. Agreements or understandings, oral or written, on the price that members or companies by whom they are employed will pay for time-sharing services or products.

This is clearly and positively forbidden by the antitrust laws. What is somewhat unusual about ATSU is that it is a user rather than a supplier association, but that does not exempt any activities in this area. Most cases have developed in connection with supplier associations and relate to "price-fixing." ATSU must not sponsor or be party to any efforts either at the Association, Chapter, or SIG level to determine the price to be paid by users for time-sharing services.

ATSU might lawfully develop a voluntary program that furnishes to members or to other interested parties, a statistical summary on a periodic basis (annually or semi-annually) of the average price paid by users for various kinds of time-sharing products or services relating to past transactions. The data provided should be in the form of composite information so that no particular vendor (or vendors)

Mr. Hillel Segal

March 18, 1975

is singled out. Reports received from user-members or associate member vendors on this subject should remain anonymous and be included in the composite data so that the identity of the users or vendors cannot be discovered. Such data should be collected through an organization independent of ATSU. Associate member vendors might participate in the program although their participation should be carefully reviewed in advance. In any event, statistical programs of trade associations usually require an examination by counsel to determine their lawfulness.

2. Boycotts or agreements not to purchase from specific vendors.

There should be no agreement or understanding to refrain from using any particular vendor or vendors of time-sharing services for any reason. There should also be no agreement or understanding to use only certain vendors of such services. These are matters not within ATSU's scope. The subject of using or not using a particular vendor must be left to the discretion of those independent companies that employ regular members of ATSU.

ATSU has to be cautious in disseminating derogatory information about any vendor even though substantiated, or in publicizing a particular vendor or his products or services to the exclusion of others, if such a program is contemplated, as it could be considered a form of boycott if a pattern of conduct by user-members suggests that that is the effect of such a program.

This does not mean that ATSU cannot keep members current on various developments affecting the industry in general even though specific users or vendors are identified.

These two kinds of activities can clearly subject ATSU members to criminal charges in addition to private treble damage suits.

There are many other kinds of activity that relate to compliance with the antitrust laws by trade associations. The development of "codes of ethics," and industry standards are examples. These subjects can be reviewed as they arise for antitrust problems. It is difficult to be more concrete since ATSU is still in an embryonic state and its future programs are not definite.

For the present I recommend that the above items be published and distributed to all members in whatever form you

Mr. Hillel Segal

March 18, 1975

choose. I assume that most of the regular members have little familiarity with federal antitrust law and its application to ATSU. I have attempted to set out the two kinds of activities that create the most serious problems for an association such as this and which are relevant to the kind of association that ATSU is becoming.

3. Recommended procedures for ATSU.

The following are recommendations made to assure that ATSU will not become involved in activities that are violations of the antitrust laws:

(a) Published Agenda - Each meeting, whether at the Association, Chapter or SIG level should have an agenda prepared in advance of the meeting that identifies the subjects to be discussed. This is particularly important for the Chapter or SIG meetings since its members do not have counsel in attendance to handle questionable areas that might arise. ATSU of necessity should be informed of the subjects being discussed at the local Chapter or SIG level to provide adequate guidance and should receive copies of the local meeting agenda in advance of those meetings. ATSU should follow its by-laws and other procedures that will be developed that may limit the subjects discussed and the manner in which such subjects are properly discussed.

(b) Minutes - Minutes should be made of all meetings of the parent organization. Minutes of the local Chapter or SIG group meetings should also be taken and provided to the parent organization. These should be reviewed by counsel.

(c) "Rump" Meetings - ATSU should not encourage any rump business sessions before or after meetings. All business affairs should be confined to the formal meeting.

(d) Associate Members' Participation in ATSU Business Matters

Since vendor representatives may join ATSU, obtain associate member status and attend ATSU meetings, care must be exercised as to the nature of their participation in ATSU activities. Policy on this matter can be developed as ATSU's activities become more definite.

(e) Publications of ATSU - All materials that may be published or distributed by ATSU should be reviewed by counsel in advance of publication or distribution.

-5-

Mr. Hillel Segal

March 18, 1975

These are procedures that I believe should be adopted as policy and published so that each member will be made aware of the obligations that both he (and she) and the Association have under the federal antitrust laws in conducting ATSU activities. As new members join ATSU, they should be apprised of ATSU's policies in this regard.

While much of this letter is stated in the negative, I think you will find as time goes on that there are many subjects in which members are interested that do not involve antitrust consequences for ATSU and are properly subjects for its consideration and action.

Very truly yours,

  
Martin J. Neville

MJN:ma



## **I. ARTICLES OF INCORPORATION**

## **II. SYNOPSIS OF BY-LAWS**

## **III. BY-LAWS**

As amended by the Association's Board of Directors (the Council) on August 4, 1977: Article IV, Sections 1, 2, and 3; Article VII, Section 1; Article XII, Section 1. (The previous By-Laws may be referred to for comparison purposes.)



CERTIFICATE OF INCORPORATION  
OF ~~TIME SHARING~~ **COMPUTER** USERS, INC.  
THE ASSOCIATION OF  
UNDER Section 402 OF THE NOT-FOR-PROFIT CORPORATION LAW

The undersigned, for the purpose of forming a corporation under Section 402 of the Not-for-Profit Corporation Law, hereby certifies:

1. The name of the corporation is

THE ASSOCIATION OF ~~TIME SHARING~~ USERS, INC.

2. The corporation has not been formed for pecuniary profit or financial gain and no part of the assets, income or profit of the corporation is distributable to, or insures to, the benefit of, its members, directors, or officers, except to the extent permitted under the Not-for-Profit Corporation Law.

3. The purposes for which the corporation is to be formed are as follows:

- (a) To act as non-profit independent computer ~~time-sharing~~ user association, representing the needs of its members and promoting the free interchange of ideas about ~~time-sharing~~ <sup>computer</sup> products and services.
- (b) To promote the use of computer time-sharing for improved decision making and to encourage continuous improvement in the efficiency and capability of time-sharing products and services. Also, to encourage an increase in the range of products and services available to individual ~~computer time-sharing~~ <sup>computer</sup> users.
- (c) To act as a clearing house and publisher of information about ~~time-sharing~~ <sup>computer</sup> products and services.
- (d) To conduct or engage in all lawful activities within or without the United States in furtherance of the foregoing purposes, or incidental thereto.

4. The corporation is a Type A corporation.

5. The City and County in which the corporation's principal office is to be located are the City of New York and the County of New York.

6. The territory in which the corporation's activities are principally to be conducted comprises the several states and territories of the United States and the District of Columbia.

7. The corporation may have more than one class of members, each with qualifications, privileges and voting rights as specified by the By-Laws or by Resolution of the Board of Directors.

8. The post-office address to which the Secretary of State shall mail a copy of any notice required by law is: Martin J. Neville, Esq., c/o Burns, Van Kirk, Greene & Kafer, 521 Fifth Avenue, New York, NY 10017.

9. The incorporator is of the age of nineteen (19) years, or over.

10. All approvals or consents required by Section 404 of the New York Not-for-Profit Corporation Law are endorsed or annexed to this certificate.

IN WITNESS WHEREOF, this certificate has been signed by the incorporator this 31st day of January, 1975.

Hillel Segal                                  Incorporator  
351 East 84 Street  
New York, NY 10028

STATE OF NEW YORK )  
STATE OF NEW YORK ) SS.:

On the 31st day of January, 1975, before me personally came HILLEL SEGAL, to me known to be the individual described in and who executed the foregoing instrument, and acknowledged that he executed the same.

Notary Public



## I. ARTICLES OF INCORPORATION

## II. SYNOPSIS OF BY-LAWS

## III. BY-LAWS

As amended by the Association's Board of Directors (the Council) on August 4, 1977: Article IV, Sections 1, 2, and 3; Article VII, Section 1; Article XII, Section 1. (The previous By-Laws may be referred to for comparison purposes.)

CERTIFICATE OF INCORPORATION  
OF ~~TIME SHARING~~ <sup>COMPUTER</sup> USERS, INC.  
UNDER Section 402 OF THE NOT-FOR-PROFIT CORPORATION LAW

The undersigned, for the purpose of forming a corporation under Section 402 of the Not-for-Profit Corporation Law, hereby certifies:

1. The name of the corporation is

~~THE ASSOCIATION OF TIME SHARING~~ <sup>COMPUTER</sup> USERS, INC.

2. The corporation has not been formed for pecuniary profit or financial gain and no part of the assets, income or profit of the corporation is distributable to, or insures to, the benefit of, its members, directors, or officers, except to the extent permitted under the Not-for-Profit Corporation Law.

3. The purposes for which the corporation is to be formed are as follows:

- (a) To act as non-profit independent computer ~~time sharing~~ <sup>computer</sup> user association, representing the needs of its members and promoting the free interchange of ideas about ~~time sharing~~ <sup>computer</sup> products and services.
- (b) To promote the use of computer ~~time sharing~~ <sup>computer</sup> for improved decision making and to encourage continuous improvement in the efficiency and capability of ~~time sharing~~ <sup>computer</sup> products and services, and also, to encourage an increase in the range of products and services available to individual computer ~~time sharing~~ <sup>computer</sup> users.
- (c) To act as a clearing house and publisher of information about ~~time sharing~~ <sup>computer</sup> products and services.
- (d) To conduct or engage in all lawful activities within or without the United States in furtherance of the foregoing purposes, or incidental thereto.

4. The corporation is a Type A corporation.

5. The City and County in which the corporation's principal office is to be located are the City of New York and the County of New York.

6. The territory in which the corporation's activities are principally to be conducted comprises the several states and territories of the United States and the District of Columbia.

7. The corporation may have more than one class of members, each with qualifications, privileges and voting rights as specified by the By-Laws or by Resolution of the Board of Directors.

8. The post-office address to which the Secretary of State shall mail a copy of any notice required by law is: Martin J. Neville, Esq., c/o Burns, Van Kirk, Greene & Kafer, 521 Fifth Avenue, New York, NY 10017.

9. The incorporator is of the age of nineteen (19) years, or over.

10. All approvals or consents required by Section 404 of the New York Not-for-Profit Corporation Law are endorsed or annexed to this certificate.

IN WITNESS WHEREOF, this certificate has been signed by the incorporator this <sup>6th</sup> ~~31st~~ day of <sup>April</sup> ~~January~~, 1975 <sup>1979</sup>

STATE OF NEW YORK )  
STATE OF NEW YORK ) SS.:

Hillel Segal  
~~351 East 84 Street~~  
New York, NY 10028  
c/o Burns, Van Kirk, Greene & Kafer  
521 Fifth Ave, New York, NY 10017

Incorporator

On the 31st day of January, 1975, before me personally came HILLEL SEGAL, to me known to be the individual described in and who executed the foregoing instrument, and acknowledged that he executed the same.

- (d) To sponsor public discussion forums, panels and lectures concerning new computer technologies and methods of evaluating such technologies
- (e) To act as an educational and scientific organization under the rules for a 501-C-3 organization as defined by the Internal Revenue Service.

COMPUTER  
THE ASSOCIATION OF TIME-SHARING USERS, INC.  
Synopsis of By-Laws

The By-Laws have been developed to meet the specific organizational structure of The Association of Time-Sharing Users, Inc. (ATSU) as planned within the statutory framework of the New York State Not-for-Profit Corporation Law.

Name - Article I

Provides that the name is The Association of Time-Sharing Users, Inc. and is a New York based corporation.

Purposes - Article II

States that the purposes of ATSU are as stated in the Certificate of Incorporation:

- (a) To act as a non-profit independent computer time-sharing user association, representing the needs of its members and promoting the free interchange of ideas about time-sharing products and services.
- (b) To promote the use of computer time-sharing for improved decision making and to encourage continuous improvement in the efficiency and capability of time-sharing products and services. Also, to encourage an increase in the range of products and services available to individual computer time-sharing users.
- (c) To act as a clearing house and publisher of information about time-sharing products and services.
- (d) To conduct or engage in all lawful activities within or without the United States in furtherance of the foregoing purposes, or incidental thereto.

Structure - Article III

ATSU will serve as a parent organization for geographically based Chapters and for Special Interest Groups, composed of members from various Chapters sharing specific common interests. These subordinate Chapters and SIGs are established by the Board of Directors and are governed by the policy set forth in the Certificate of Incorporation and the By-Laws. Except as so stated their activity will be self-regulated.

Membership - Articles IV Through VII

Article IV specifies three classes of membership, (1) Regular Membership for individuals who are users or prospective users of time-sharing services, and who are not primarily involved in the sale of time-sharing services, (2) Associate Membership for individuals who are primarily involved in the sale of time-sharing services, equipment or related services, and (3) Corporate Associate Membership for companies which are involved in the sale of time-sharing services, equipment, software, or related services. Associate members and the representatives of Corporate Associate members may not hold office and do not have voting rights. Article IV also specifies that a member may be expelled for failure to pay dues or for other cause by the Board of Directors.

Article V provides for an annual membership meeting for the election of directors and all officers except the Executive Director, who shall be elected by the Board of Directors.

Article VI governs the call of special meetings of the members if such meeting is required.

Article VII establishes a quorum for membership meetings of one-tenth of all Regular members represented in person or by proxy. When a quorum is present, the members shall act by affirmative majority vote unless otherwise specified.

Board of Directors (Council) - Articles VIII Through XI

Article VIII provides for a Board of Directors (or Council) to act as the governing body of the Association. Each Chapter may nominate one person to serve on the Board provided the maximum number of Board members has not been reached. The directors are elected at the annual meeting of members.

Article IX provides a framework for Board meetings and provides that a quorum for its action is one-third.

Officers - Article XII

Article XII provides for (a) four officers, President, Vice President, Secretary and Treasurer who are elected every year by the membership, and (b) an Executive Director who is elected by the Board for a term of one or more years. The Executive Director is the Association's chief executive officer responsible for its general and active management as directed by the Board. The President is designated as chief spokesman for ATSU and shall preside at all meetings of the members and Board. The other officers serve the usual functions denoted by their office.

General Provisions - Article XIII

This is a statement of policy that ATSU will not endorse any particular computer time-sharing vendor or supplier. However, ATSU is authorized to alert members to unscrupulous acts by any vendor or supplier, to report of computer time-sharing system failures, lawsuits, and other industry related problems. In addition, it is authorized to publish an annual "Disclosure Statement" itemizing any complimentary goods or services received.

Amendments to By-Laws - Article XIV

The By-Laws may be amended by vote of the members or by vote of the Board of Directors.

If the above Synopsis, which was prepared for the convenience of members of ATSU, appears in any way to be in conflict with the By-Laws, the By-Laws will control.

9/10

BY-LAWS  
OF COMPUTER  
THE ASSOCIATION OF TIME-SHARING USERS, INC.

1

ALL CAPS  
HOLD

ARTICLE I  
NAMES AND OFFICES

Section 1. The name of the Association is

THE ASSOCIATION OF COMPUTER TIME-SHARING USERS, INC.

2. → Section 2. The office of the Association shall be located in the City of New York, New York.

Section 3. The Association may also have offices at such other places both within and without the State of New York as the Board of Directors (also known as the "Council") may from time to time determine or the business of the Association may require.

ARTICLE II  
PURPOSES

u8lc 11-4

The purposes of the Association shall be those stated in its Certificate of Incorporation, and any amendments thereto, as filed with the Secretary of State, State of New York. *These are:*

(A)  
↓  
(F)

ARTICLE III  
ORGANIZATIONAL STRUCTURE

Section 1. The Association shall serve as a parent organization for regional groups of members known as Chapters, and also groups based upon functional discipline known as Special Interest Groups. The Chapters and Special Interest Groups shall provide a forum for the direct interchange of ideas and information about time-sharing products and services. The function of the parent organization shall be to support the Chapters and Special Interest Groups, to gather information centrally regarding time-sharing products and services and to disseminate relevant material to all members.

*Sections.*

Section 2. The Board may authorize members to form Chapters based on geographic areas and Special Interest Groups upon functional discipline. The Chapters or Special Interest Groups may determine their own organizational structure provided their affairs are conducted in accordance with the policy set forth in the parent organization's Certificate of Incorporation and these By-Laws. Each Chapter and Special Interest Group may choose their own officers and directors. Each Chapter shall be eligible to nominate its president or other representative to serve on the Board of Directors of the Association, subject to the limitations in Article IX of these By-Laws relating to the size of the Board. Officers and directors of the Association, each Chapter and Special Interest Groups, shall be required to disclose to the Board of Directors of the Association the existence of the receipt of any complimentary goods or services or of any financial or business relationship with any time-sharing vendor, or supplier or related company.

*Sections based on the Board of Directors, each Chapter and Special Interest Group.*

Section 3. Members of each Chapter and Special Interest Group must also be members of the Association.

Section 4. With the approval of the Board of Directors, dues, membership fees, and special assessments may be levied by the Association, the Chapters, or the Special Interest Groups.

*Sections.*

ARTICLE IV  
MEMBERSHIP

Section 1. The Association shall have the following classes of membership and any additional classes as may be prescribed by a Resolution of the Board of Directors.

- computer equipment or related*
- (a) Regular Membership - Any individual who subscribes to the purposes of the Association, as set forth in the Certificate of Incorporation, who is a user or prospective user of time-sharing services, and who is not primarily involved in the sale of time-sharing services, equipment, software, or other related services. Each regular member shall have all the privileges and voting rights as specified in these By-Laws.
  - (b) Associate Membership - Any individual who subscribes to the purposes of the Association, as set forth in the Certificate of Incorporation, and who is primarily involved in the sale of time-sharing services, equipment, software, or related services. Associate members may not hold office and have no voting rights. Associate Members may not promote specific products or services while attending Association functions, unless called upon by regular members to describe a particular product.
  - (c) Corporate Associate Membership - Any corporation (or division of any corporation) which subscribes to the purposes of the Association, as set forth in the Certificate of Incorporation, which is primarily involved in the sale of time-sharing services, equipment, software, or related services. Corporate Associate members may not hold office and have no voting rights, and their designees may not hold office.

Section 2. Candidates may apply for membership by mailing a completed membership application together with dues or membership fees as prescribed by the Board of Directors to the office of the Association. The Executive Director may admit candidates to membership upon determining that the requisite membership qualifications have been met.

Section 3. Each member agrees to be bound by these By-Laws and all amendments thereof upon being admitted to membership in the Association.

2

Section 4. Any member of the Association may withdraw from membership by tendering a written resignation to the Board.

Section 5. Any member whose membership in this Association shall have terminated by resignation or other cause shall forfeit thereby all interest in any and all funds, property, rights and interests belonging to this Association.

Section 6. A member may be suspended, or his membership terminated, for failure to pay dues or assessments, or for a violation of any of the provisions contained in the Certificate of Incorporation or By-Laws. A suspension or termination shall require a two-thirds vote of the Board of Directors.

#### ARTICLE V ANNUAL MEETINGS OF MEMBERS

Section 1. All annual meetings of members for the election of Directors and those officers specified in Article XII, may be held at such ~~time and~~ place within or without the State of New York as shall be stated in the notice of the meeting or in a duly executed waiver of notice thereof.

Section 2. Annual meetings of members, ~~commencing with the year 1975~~, shall be held on the first Wednesday in April if not a legal holiday, and if a legal holiday, then on the next secular day following, at 10:00 a.m., at which ~~they~~ shall elect by a plurality vote, a Board of Directors, and transact such other business as may properly be brought before the meeting.

Section 3. Written or printed notice of the annual meeting stating the place, date and hour of the meeting shall be delivered not less than ten nor more than fifty days before the date of the meeting, either personally or by mail, by or at the direction of the president, the secretary, or the officer or person calling the meeting, to each member entitled to vote at such meeting.

#### ARTICLE VI SPECIAL MEETINGS OF MEMBERS

Section 1. Special meetings of members may be held at such time and place within or without the State of New York as shall be stated in the notice of the meeting or in a duly executed waiver of notice thereof.

Section 2. Special meetings of the members, for any purpose or purposes, unless otherwise prescribed by statute or by the Certificate of Incorporation, may be called by the president, the Board of Directors, or by one-third of the members, *eligible to vote.*

Section 3. Written or printed notice of a special meeting stating the place, date and hour of the meeting and the purpose or purposes for which the meeting is called, shall be delivered not less than ten nor more than fifty days before the date of the meeting, either personally or by mail, by, or at the direction of, the president, the secretary, or other officer or person calling the meeting, to each member entitled to vote at such meeting. The notice should also indicate that it is being issued by, or at the direction of the person calling the meeting.

#### ARTICLE VII QUORUM AND VOTING OF MEMBERS

Section 1. One-tenth of all Regular Members represented in person or by proxy shall constitute a quorum at all meetings of the members for the transaction of business, except as otherwise provided by statute or by the Certificate of Incorporation. If, however, such quorum shall not be present or represented at any meeting of the members, the members present in person or represented by proxy shall have power to adjourn the meeting from time to time, without notice other than announcement at the meeting, until a quorum shall be present or represented. At such adjourned meeting at which a quorum shall be present or represented any business may be transacted which might have been transacted at the meeting as originally notified.

Section 2. If a quorum is present, the affirmative vote of a majority of the members entitled to vote at the meeting shall be the act of the members, unless the vote of a greater or lesser number of members is required by law or the Certificate of Incorporation.

Section 3. Each member having voting power shall be entitled to one vote on each matter submitted to a vote at a meeting of members. A member may vote either in person or by proxy executed in writing by the member or by his duly authorized attorney-in-fact. Only regular members shall have the right to vote.

Section 4. The Board of Directors in advance of any members' meeting may appoint one or more inspectors to act at the meeting or any adjournment thereof. If inspectors are not so appointed, the person presiding at a members' meeting may, and, on the request of any member entitled to vote thereat, shall appoint one or more inspectors. In case any person appointed as inspector fails to appear or act, the vacancy may be filled by the Board in advance of the meeting or at the meeting by the person presiding thereat.

Section 5. Whenever members are required or permitted to take any action by vote, such action may be taken without a meeting on written consent, setting forth the action so taken, signed by all of the members entitled to vote thereon.



3  
The Directors shall include the President, Vice President, Secretary, Treasurer and Executive Director of the Association, and the Chairman, Vice Chairman and Executive Director of each of its Sections.

ARTICLE VIII  
BOARD OF DIRECTORS  
(THE COUNCIL)

Section 1. The number of Directors shall be not less than ~~eight~~ <sup>five</sup> and shall not exceed the maximum number as fixed from time to time by Resolution of the Board. In the absence of such a Resolution, the maximum number shall be ~~twelve~~ <sup>five</sup>. Directors shall be at least twenty-one years of age and need not be residents of the State of New York. ~~The president or a designated representative of each Chapter shall be eligible to be nominated for election to the Board of Directors provided that the maximum number of Board Members has not been reached.~~ The Directors, ~~other than the first Board of Directors,~~ shall be elected at the annual meeting of the members, except as hereinafter provided, and each Director elected shall serve until the next succeeding annual meeting and until his successor shall have been elected and installed.

Section 2. Any or all of the Directors may be removed, with or without cause, at any time by the vote of the regular members at a special meeting called for that purpose.

by the Board, and all other <sup>Sections authorized</sup>  
Section 3. Newly created Directorships resulting from an increase in the number of Directors and vacancies among such Directors, shall be filled by the current Board. A Director ~~directed~~ <sup>authorized</sup> to fill a newly created position shall serve until the next succeeding annual meeting of members and until his successor shall have been elected and installed.

Section 4. The business affairs and the activities of the Association shall be managed by its Board of Directors which may exercise all such powers of the Association and do all such lawful acts and things as are not by statute or by the Certificate of Incorporation or by these By-Laws directed or required to be exercised or done by the members.

Section 5. The Directors may keep the books of the Association, except such as are required by law to be kept within the State, outside the State of New York, at such place or places as they may from time to time determine.

Section 6. The Board of Directors, by the affirmative vote of a majority of the Directors then in office, shall have authority to establish reasonable compensation, if any, of all Directors for services to the Association as Directors, officers or otherwise.

Section 7. The Board of Directors may also be known as the "Council" of the Association and use of the word "Council" for any corporate purpose shall be equivalent to use of the words "Board of Directors."

ARTICLE IX  
MEETINGS OF THE BOARD OF DIRECTORS (COUNCIL)

Section 1. Meetings of the Board of Directors, regular or special, may be held either within or without the State of New York.

Section 2. The first meeting of each newly elected Board of Directors shall be held immediately after the annual members meeting electing such Board and no notice of such meeting shall be necessary to the newly elected Directors in order legally to constitute the meeting, provided a quorum shall be present, or it may convene at such place and time as shall be fixed by the consent in writing of all the Directors.

Section 3. Regular meeting of the Board of Directors may be held upon such notice, or without notice, and at such time and at such place as shall from time to time be determined by the Board.

Section 4. Special meetings of the Board of Directors may be called by the president on at least five business days' notice to each Director, either personally or by mail or by telegram; special meetings shall be called by the president or secretary in like manner and on like notice on the written request of one-half of the Directors currently serving on the Board of Directors.

Section 5. Notice of a meeting need not be given to any Director who submits a signed waiver of notice whether before or after the meeting, or who attends the meeting without protesting, prior thereto or at its commencement, the lack of notice. Neither the business to be transacted at, nor the purpose of, any regular or special meeting of the Board of Directors need be specified in the notice or waiver of notice of such meeting.

Section 6. One-third of the Directors shall constitute a quorum for the transaction of business unless a greater or lesser number is required by law. The vote of a majority of the Directors present at any meeting at which a quorum is present shall be the act of the Board of Directors, unless the vote of a greater number is required by law or by the Certificate of Incorporation. If a quorum shall not be present at any meeting of Directors, a majority of the Directors present may adjourn the meeting from time to time, without notice other than announcement at the meeting, until a quorum shall be present.

ARTICLE X  
EXECUTIVE COMMITTEE

Section 1. The Board of Directors, by Resolution adopted by a majority of the entire Board, may designate an executive committee and other standing committees, and each of which, to the extent provided in the Resolution, shall have all the authority of the Board, except as otherwise required by law. Vacancies in the membership of the committee shall be filled by the Board of Directors at a regular or special meeting of the Board of Directors. The executive committee shall keep regular minutes of its proceedings and report the same to the Board when required.

4  
\* and the members of each Section shall elect a Chairman and Vice  
Chairman from among the members of each respective Section.

#### ARTICLE XI NOTICES

Section 1. Whenever, under the provisions of the statutes or of the Certificate of Incorporation or of these By-Laws, notice is required to be given to any Director or member it shall not be construed to require personal notice, but such notice may also be given in writing, by mail, addressed to such Director or member, at his address as it appears on the records of the Association, with postage thereon prepaid, and such notice shall be deemed to be given at the time when the same shall be deposited in the United States mail. Notice to Directors may also be given by telegram.

Section 2. Whenever any notice of a meeting is required to be given under the provisions of the statutes or under the provisions of the Certificate of Incorporation or these By-Laws, a waiver thereof in writing signed by the person or persons entitled to such notice, whether before or after the time stated therein, shall be deemed equivalent to the giving of such notice.

#### ARTICLE XII OFFICERS

Section 1. The officers of the Association to be elected by the members shall consist of a President, a Vice President, a Secretary and a Treasurer. The officer to be <sup>appointed</sup> ~~elect~~ by the Board of Directors shall be the Executive Director. Officers shall serve for a term of one (1) year and may be re-elected for additional terms of one (1) year each except for the Executive Director who may be <sup>appointed</sup> ~~elect~~ for a term of more than one year as determined by the Board of Directors.

Section 2. The <sup>Association</sup> ~~members~~ at each annual meeting of members shall choose a President, Vice President, Secretary and Treasurer from among the members. The Board of Directors shall <sup>appoint</sup> ~~choose~~ an Executive Director who may or may not be a member, <sup>who also serves as Executive Director of each Section.</sup>

~~No more than two offices may be held by the same person.~~ The offices of President and Secretary may not be held by the same person.

Section 3. The Board of Directors may appoint such other officers and agents as it shall deem necessary who shall hold their offices for such terms and shall exercise such powers and perform such duties as shall be determined from time to time by the Board of Directors.

Section 4. Remuneration of any officers, employees or agents of the Association shall be fixed by the Board of Directors.

Section 5. The officers of the Association shall hold office until their successors are chosen and installed. Any officer may be removed at any time by the affirmative vote of a majority of the members. Any vacancy occurring in any office of the Association shall be filled by the Board of Directors and the newly appointed officer shall serve until the next annual meeting of the members.

#### THE PRESIDENT

Section 6. The President shall be the chief spokesman for the Association, shall <sup>general</sup> ~~preside~~ at all meetings of the members and the Board of Directors, and shall have other duties as prescribed by the Board.

#### THE VICE PRESIDENT

Section 7. The Vice President shall, in the absence or disability of the President, perform the duties and exercise the powers of the President and shall perform such other duties and have such other powers as the Board of Directors may from time to time prescribe.

#### EXECUTIVE DIRECTOR

Section 8. The Executive Director shall be the executive officer of the Association, <sup>and</sup> shall have general and active management of the activities and the business of the Association and shall see that all orders and resolutions of the Board of Directors are carried into effect.

The Executive Director shall execute bonds, mortgages and other contracts requiring ~~a seal under~~ the seal of the Association, except where required or permitted by law to be otherwise signed and executed and except where the signing and execution thereof shall be expressly delegated by the Board of Directors to some other officer or agent of the Association.

#### THE SECRETARY

Section 9. <sup>general</sup> ~~The Secretary shall attend all meetings of the Board of Directors and all meetings of the members and record all the proceedings of the meetings of the Association and of the Board of Directors in a book to be kept for that purpose, and shall perform like duties for the standing committees when required.~~ He shall give, or cause to be given, notice of all meetings of the members and special meetings of the Board of Directors, and shall perform such other duties as may be prescribed by the Board of Directors, under whose supervision he shall be. He shall have custody of the corporate seal of the Association and he shall have authority to affix the same to any instrument requiring it and, when so affixed, it may be attested by his signature. The Board of Directors may give general authority to any other officer to affix the seal of the Association and to attest the affixing by his signature.

5

THE TREASURER

Section 10. The Treasurer shall have the custody of the Association's funds and securities and shall keep full and accurate accounts of receipts and disbursements in books belonging to the Association and shall deposit all monies and other valuable effects in the name and to the credit of the Association in such depositories as may be designated by the Board of Directors.

Section 11. He shall disburse the funds of the Association as may be ordered by the Board of Directors, taking proper vouchers for such disbursements, and shall render to the Board of Directors at its regular meetings, or when the Board of Directors or the President so require, an account of all his transactions as Treasurer and of the financial condition of the Association.

Section 12. If required by the Board of Directors, he shall give the Association a bond in such sum and with such surety or sureties as shall be satisfactory to the Board of Directors for the faithful performance of the duties of his office and for the restoration to the Association, in case of his death, resignation, retirement or removal from office, of all books, papers, vouchers, money and other property of whatever kind in his possession or under his control belonging to the Association.

ARTICLE XIII  
GENERAL PROVISIONS

Section 1. All checks or demands for money and notes of the Association shall be signed by such officer or officers or such other person or persons as the Board of Directors may from time to time designate.

Section 2. The fiscal year of the Association shall be fixed by Resolution of the Board of Directors.

Section 3. The Association seal shall have inscribed thereon the name of the Association, the year of its organization and the words "Corporate Seal, New York". The seal may be used by causing it or a facsimile thereof to be impressed or affixed or in any manner reproduced.

Section 4. <sup>computer</sup> The Association will not adopt or publicize any specific or generalized endorsement or non-endorsement of any <sup>computer</sup> ~~time-sharing~~ vendor, supplier, product or service. No member is authorized to represent that the Association is recommending or suggesting the use of any particular ~~time-sharing~~ vendor, supplier, product or service. Notwithstanding the above, the Association shall be authorized to alert the membership of any unscrupulous acts on the part of any vendor or supplier and may issue through newsletter or other notification, reports of computer ~~time-sharing~~ system failures, user or vendor lawsuits, and industry problems and thereby disclosing the name of the ~~time-sharing~~ vendor or supplier involved in the same. <sup>computer</sup> *Je*

Section 5. The Association shall publish an annual "Disclosure Statement" in which any complimentary goods or services received by the Association from any <sup>computer</sup> ~~time-sharing~~ vendor or supplier will be itemized and made public.

ARTICLE XIV  
AMENDMENTS

Section 1. These By-Laws may be amended or repealed, or new By-Laws may be adopted, at any regular or special meeting of members at which a quorum is present or represented by the vote of the members entitled to vote in the election of any Director, or at a meeting of the Board of Directors by vote of a majority of such Board at which a quorum is present or represented, provided notice of the proposed alteration, amendment, or repeal, be contained in the notice of such meeting.

*to disseminate information and reports concerning such vendors, products and service.*

SECTION CHAIRMAN

Section 13. <sup>The persons elected</sup> ~~As~~ Section Chairmans shall be the chief spokesmans for each respective Section of the Association, and shall serve on the Board of Directors of the Association representing the Sections which elected them.

SECTION VICE CHAIRMAN

Section 14. The persons elected as Section Vice Chairmans shall, in the absence or disability of the respective Section Chairmans, be the chief spokesmans for each respective Section of the Association. The Section Vice Chairmans also serve on the Board of Directors of the Association representing the Sections which elected them.



# Association of Computer Users

1690 Thirty Eighth Street • Post Office Box 9003 • Boulder Colorado 80301 • 303 499-1722

## ARTICLES OF INCORPORATION

April 2, 1979

## BY-LAWS

April 4, 1979



**THE ASSOCIATION OF COMPUTER USERS, INC.  
ARTICLES OF INCORPORATION**

The undersigned person acting as incorporator under the Colorado Non-profit Corporation Act, signs, and, acknowledges the following Articles of Incorporation for such corporation.

**First:** The name of the corporation is

THE ASSOCIATION OF COMPUTER USERS, INC.

**Second:** The period of duration is perpetual.

**Third:** The purposes for which the corporation is organized are:

- (a) To act as non-profit independent computer user association, representing the needs of its members and promoting the free interchange of ideas about products and services.
- (b) To promote the use of computers for improved decision making and to encourage continuous improvement in the efficiency and capability of computer products and services, and to encourage an increase in the range of products and services available to individual computer users.
- (c) To act as a clearing house and publisher of information about computer products and services.
- (d) To sponsor public discussion forums, panels and lectures concerning the new computer technologies and methods of evaluating such technologies.
- (e) To act as an educational and scientific organization under the rules for a 501-C-3 organization as defined by the Internal Revenue Service.
- (f) To conduct or engage in all lawful activities within or without the United States in furtherance of the foregoing purposes, or incidental thereto.

**Fourth:** The association shall have the following classes of membership:

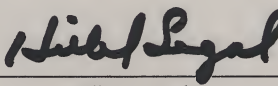
- (a) *Regular Membership* — Any individual who is a user of computer equipment or related services, and who is not primarily involved in the sale of computer equipment, software, or related services. Each regular member is entitled to one vote on each matter submitted to a vote of members.
- (b) *Associate Membership* — Any individual who is primarily involved in the sale of computer equipment, software, or related services. Associate members are ineligible to hold office and shall not be entitled to vote on any matter.
- (c) *Corporate Associate Membership* — Any corporation (or division of any corporation) which is primarily involved in the sale of computer equipment, software, or related services. Corporate Associate Members have no voting rights and they and their designees are ineligible to hold office.

**Fifth:** No part of the income or accumulated funds of the corporation will inure to the benefit of any members or individuals, and upon dissolution of the association, its then existing net assets shall be distributed among the then existing members ratably in proportion to their respective contributions or as a court might direct.

**Sixth:** The address of the initial registered office and the principal office of the corporation in Colorado is 1690 38th Street, Boulder, County of Boulder Colorado 80301 and the name of its initial registered agent at such address is Hillel Segal.

**Seventh:** The number of directors constituting the initial board of directors of the corporation is eight, and the names and addresses of the persons who are to serve as the initial directors are:

NAME	ADDRESS
Earl H. Carroll	473 Pontiac, Denver, Colorado 80220
Larry G. Leslie	UpJohn Company - 7171 Portage Road, Kalamazoo, Michigan 49001
Stuart J. Lipoff	Arthur D. Little, Inc. - 20 Acorn Park, Cambridge, Massachusetts 02140
Bennett Meyer	Singer-Kearfott - 150 Totowa Road, Wayne, New Jersey 07470
Martin J. Neville	Burns, Van Kirk, Greene & Kafer - 521 Fifth Ave., New York, New York 10017
Hillel Segal	1690 38th Street, Boulder, Colorado 80301
Leon P. Stevens	Standard Oil Co. - 200 East Randolph St., Chicago, Illinois 60601
David E. Wilson	P.S. Ross & Partners - P.O. Box 12, First Canadian Place, Toronto, Ontario, Canada



Hillel Segal,  
Incorporator

**BY-LAWS  
OF  
THE ASSOCIATION OF COMPUTER USERS, INC.**

April 4, 1979

**Article I  
NAMES AND OFFICES**

Section 1. The name of the Association is

THE ASSOCIATION OF COMPUTER USERS, INC.

Section 2. The headquarters office of the Association shall be located in the City of Boulder, Colorado.

Section 3. The Association may also have offices at such other places both within and without the State of Colorado as the Board of Directors (also known as the "Council") may from time to time determine or the business of the Association may require.

**Article II  
PURPOSES**

The purposes of the Association shall be those stated in its Certificate of Incorporation, and any amendments thereto, as filed with the Secretary of State, State of Colorado. These are:

- (a) To act as non-profit independent computer user association, representing the needs of its members and promoting the free interchange of ideas about products and services.
- (b) To promote the use of computers for improved decision making and to encourage continuous improvement in the efficiency and capability of computer products and services, and to encourage an increase in the range of products and services available to individual computer users.
- (c) To act as a clearing house and publisher of information about computer products and services.
- (d) To sponsor public discussion forums, panels and lectures concerning new computer technologies and methods of evaluating such technologies.
- (e) To act as an educational and scientific organization under the rules for a 501-C-3 organization as defined by the Internal Revenue Service.
- (f) To conduct or engage in all lawful activities within or without the United States in furtherance of the foregoing purposes, or incidental thereto.

**Article III  
ORGANIZATIONAL STRUCTURE**

Section 1. The Association shall serve as a parent organization for regional groups of members known as Chapters, and also groups based upon functional discipline known as Sections. The Chapters and Sections shall provide a forum for the direct interchange of ideas and information about computer products and related services. The function of the parent organization shall be to support the Chapters and Sections, to gather information centrally regarding computer products and related services and to disseminate relevant material to all members.

Section 2. The Board may authorize members to form Chapters based on geographic areas and Sections based upon functional discipline. The Chapters or Sections may determine their own organizational structure provided their affairs are conducted in accordance with the policies set forth by the Board of Directors, in the parent organization's Certificate of Incorporation and these By-Laws. Each Chapter and Section may choose their own officers and directors. At the annual meeting of the Association each Section shall be eligible to elect a Chairman and Vice Chairman who will both serve on the Board of Directors of the Association. All officers and directors of the Association including officers of each Chapter and Section, shall be required to disclose to the Board of Directors of the Association the existence of the receipt of any complimentary goods or services or of any financial or business relationship with any computer vendor, supplier or related company.

Section 3. Members of each Chapter and Section must also be members of the Association.

Section 4. With the approval of the Board of Directors, dues, membership fees, and special assessments may be levied by the Association, the Chapters, or the Sections.

**Article IV  
MEMBERSHIP**

Section 1. The Association shall have the following classes of membership and any additional classes as may be prescribed by a Resolution of the Board of Directors.



- (a) **Regular Membership** - Any individual who subscribes to the purposes of the Association, as set forth in the Certificate of Incorporation, who is a user or prospective user of computer equipment or related services, and who is not primarily involved in the sale of computer equipment, software, or related services. Each regular member shall have all the privileges and voting rights as specified in these By-Laws.
- (b) **Associate Membership** - Any individual who subscribes to the purposes of the Association as set forth in the Certificate of Incorporation, and who is primarily involved in the sale of computer equipment, software, or related services. Associate members may not hold office and have no voting rights. Associate Members may not promote specific products or services while attending Association functions, unless called upon by regular members to describe a particular product.
- (c) **Corporate Associate Membership** - Any corporation (or division of any corporation) which subscribes to the purposes of the Association, as set forth in the Certificate of Incorporation, which is primarily involved in the sale of computer equipment, software, or related services. Corporate Associate Members have no voting rights, and their designees may not hold office.

Section 2. Candidates may apply for membership by mailing a completed membership application together with dues or membership fees as prescribed by the Board of Directors to the office of the Association. The Executive Director may admit candidates to membership upon determining that the requisite membership qualifications have been met.

Section 3. Each member agrees to be bound by these By-Laws and all amendments thereof upon being admitted to membership in the Association.

Section 4. Any member of the Association may withdraw from membership by tendering a written resignation to the Board.

Section 5. A member may be suspended, or his membership terminated, for failure to pay dues or assessments, or for a violation of any of the provisions contained in the Certificate of Incorporation or By-Laws. A suspension or termination shall require a two-thirds vote of the Board of Directors.

Section 6. Any member whose membership in this Association shall have terminated by resignation or other cause shall forfeit thereby all interest in any and all funds, property, rights and interests belonging to this Association.

#### Article V ANNUAL MEETINGS OF MEMBERS

Section 1. All annual meetings of members for the election of Directors and those officers specified in Article XII, may be held at such place within or without the State of Colorado as shall be stated in the notice of the meeting or in a duly executed waiver of notice thereof.

Section 2. Annual meetings of members shall be held on the second Thursday in April if not a legal holiday, and if a legal holiday, then on the next secular day following, at 10:00 a.m., at which shall be elected by a plurality vote, a Board of Directors, and transact such other business as may properly be brought before the meeting.

Section 3. Written or printed notice of the annual meeting stating the place, date and hour of the meeting shall be delivered not less than ten nor more than fifty days before the date of the meeting, either personally or by mail, by or at the direction of the president, the secretary, or the officer or person calling the meeting, to each member entitled to vote at such meeting.

#### Article VI SPECIAL MEETINGS OF MEMBERS

Section 1. Special meetings of members may be held at such time and place within or without the State of Colorado as shall be stated in the notice of the meeting or in a duly executed waiver of notice thereof.

Section 2. Special meetings of the members, for any purpose or purposes, unless otherwise prescribed by statute or by the Certificate of Incorporation, may be called by the president, the Board of Directors, or by one-third of the members eligible to vote.

Section 3. Written or printed notice of a special meeting stating the place, date and hour of the meeting and the purpose or purposes for which the meeting is called, shall be delivered not less than ten nor more than fifty days before the date of the meeting, either personally or by mail, by, or at the direction of, the president, the secretary, or other officer or person calling the meeting, to each member entitled to vote at such meeting. The notice should also indicate that it is being issued by, or at the direction of the person calling the meeting.

#### Article VII QUORUM AND VOTING OF MEMBERS

Section 1. One-tenth of all Regular Members represented in person or by proxy shall constitute a quorum at all meetings of the members for the transaction of business, except as otherwise provided by statute or by the Certificate of Incorporation. If, however, such quorum shall not be present or represented at any meeting of the members, the members present in person or represented by proxy shall have power to adjourn the meeting from time to time, without notice other than announcement at the meeting, until a quorum shall be present or represented. At such adjourned meeting at which a quorum shall be present or represented any business may be transacted which might have been transacted at the meeting as originally notified.

Section 2. If a quorum is present, the affirmative vote of a majority of the members entitled to vote at the meeting shall be the act of the members, unless the vote of a greater or lesser number of members is required by law or the Certificate of Incorporation.

Section 3. Each member having voting power shall be entitled to one vote on each matter submitted to a vote at a meeting of members. A member may vote either in person or by proxy executed in writing by the member or by his duly authorized attorney-in-fact. Only regular members shall have the right to vote.

Section 4. The Board of Directors in advance of any members' meeting may appoint one or more inspectors to act at the meeting or any adjournment thereof. If inspectors are not so appointed, the person presiding at a members' meeting may, and, on the request of any member entitled to vote thereat, shall appoint one or more inspectors. In case any person appointed as inspector fails to appear or act, the vacancy may be filled by the Board in advance of the meeting or at the meeting by the person presiding thereat.

Section 5. Whenever members are required or permitted to take any action by vote, such action may be taken without a meeting or written consent, setting forth the action so taken, signed by all of the members entitled to vote thereon.

### **Article VIII BOARD OF DIRECTORS (THE COUNCIL)**

Section 1. The number of Directors shall be not less than five and shall not exceed the maximum number as fixed from time to time by Resolution of the Board. In the absence of such a Resolution, the maximum number shall be fourteen. Directors shall be at least twenty-one years of age and need not be residents of the State of Colorado. The Directors shall include the President, Vice President, Secretary, Treasurer and Executive Director of the Association, and the Chairman, Vice Chairman and Executive Director of each of its Sections. The Directors shall be elected at the annual meeting of the members, except as hereinafter provided, and each Director elected shall serve until the next succeeding annual meeting and until his successor shall have been elected and installed.

Section 2. Any or all of the Directors may be removed, with or without cause, at any time by the vote of the regular members at a special meeting called for that purpose.

Section 3. Newly created Directorships resulting from an increase in the number of Sections authorized by the Board, and all other vacancies among Directors, shall be filled by the current Board. A Director appointed by the Board to fill a newly created position shall serve until the next succeeding annual meeting of members and until his successor shall have been elected and installed.

Section 4. The business affairs and the activities of the Association shall be managed by its Board of Directors which may exercise all such powers of the Association and do all such lawful acts and things as are not by statute or by the Certificate of Incorporation or by these By-Laws directed or required to be exercised or done by the members.

Section 5. The Directors may keep the books of the Association, except such as are required by law to be kept within the State, outside the State of Colorado, at such place or places as they may from time to time determine.

Section 6. The Board of Directors, by the affirmative vote of a majority of the Directors then in office, shall have authority to establish reasonable compensation, if any, of all Directors for services to the Association as Directors, officers or otherwise.

Section 7. The Board of Directors may also be known as the "Council" of the Association and use of the word "Council" for any corporate purpose shall be equivalent to use of the words "Board of Directors."

### **Article IX MEETINGS OF THE BOARD OF DIRECTORS (COUNCIL)**

Section 1. Meetings of the Board of Directors, regular or special, may be held either within or without the State of Colorado.

Section 2. The first meeting of each newly elected Board of Directors shall be held immediately after the annual members' meeting electing such Board and no notice of such meeting shall be necessary to the newly elected Directors in order legally to constitute the meeting, provided a quorum shall be present, or it may convene at such place and time as shall be fixed by the consent in writing of all the Directors.

Section 3. Regular meeting of the Board of Directors may be held upon such notice, or without notice, and at such time and at such place as shall from time to time be determined by the Board.

Section 4. Special meetings of the Board of Directors may be called by the president on at least five business days' notice to each Director, either personally or by mail or by telegram; special meetings shall be called by the president or secretary in like manner and on like notice on the written request of one-half of the Directors currently serving on the Board of Directors.

Section 5. Notice of a meeting need not be given to any Director who submits a signed waiver of notice whether before or after the meeting, or who attends the meeting without protesting, prior thereto or at its commencement, the lack of notice.



Neither the business to be transacted at, nor the purpose of, any regular or special meeting of the Board of Directors need be specified in the notice or waiver of notice of such meeting.

Section 6. One-third of the Directors shall constitute a quorum for the transaction of business unless a greater or lesser number is required by law. The vote of a majority of the Directors present at any meeting at which a quorum is present shall be the act of the Board of Directors, unless the vote of a greater number is required by law or by the Certificate of Incorporation. If a quorum shall not be present at any meeting of Directors, a majority of the Directors present may adjourn the meeting from time to time, without notice other than announcement at the meeting, until a quorum shall be present.

#### **Article X EXECUTIVE COMMITTEE**

Section 1. The Board of Directors, by Resolution adopted by a majority of the entire Board, may designate an executive committee and other standing committees, and each of which, to the extent provided in the Resolution, shall have all the authority of the Board, except as otherwise required by law. Vacancies in the membership of the committee shall be filled by the Board of Directors at a regular or special meeting of the Board of Directors. The executive committee shall keep regular minutes of its proceedings and report the same to the Board when required.

#### **Article XI NOTICES**

Section 1. Whenever, under the provisions of the statutes or of the Certificate of Incorporation or of these By-Laws, notice is required to be given to any Director or member, it shall not be construed to require personal notice, but such notice may also be given in writing, by mail, addressed to such Director or member, at his address as it appears on the records of the Association, with postage thereon prepaid, and such notice shall be deemed to be given at the time when the same shall be deposited in the United States mail. Notice to Directors may also be given by telegram.

Section 2. Whenever any notice of a meeting is required to be given under the provisions of the statutes or under the provisions of the Certificate of Incorporation or these By-Laws, a waiver thereof in writing signed by the person or persons entitled to such notice, whether before or after the time stated therein, shall be deemed equivalent to the giving of such notice.

#### **Article XII OFFICERS**

Section 1. The officers of the Association to be elected by the members shall consist of a President, a Vice President, a Secretary and a Treasurer. The officer to be appointed by the Board of Directors shall be the Executive Director. Officers shall serve for a term of one (1) year and may be re-elected for additional terms of one (1) year each except for the Executive Director who may be appointed for a term of more than one year as determined by the Board of Directors.

Section 2. The Association's members at each annual meeting of members shall choose a President, Vice President, Secretary and Treasurer from among the members, and the members of each Section shall elect a Chairman and Vice Chairman from among the members of each respective Section. The Board of Directors shall appoint the Executive Director, who may or may not be a member, who also serves as Executive Director of each Section. The offices of President and Secretary may not be held by the same person.

Section 3. The Board of Directors may appoint such other officers and agents as it shall deem necessary who shall hold their offices for such terms and shall exercise such powers and perform such duties as shall be determined from time to time by the Board of Directors.

Section 4. Remuneration of any officers, employees or agents of the Association shall be fixed by the Board of Directors.

Section 5. The officers of the Association shall hold office until their successors are chosen and installed. Any officer may be removed at any time by the affirmative vote of a majority of the members. Any vacancy occurring in any office of the Association shall be filled by the Board of Directors and the newly appointed officer shall serve until the next annual meeting of the members.

#### **PRESIDENT**

Section 6. The President shall be the chief spokesman for the Association, shall preside at all general meetings of the members and the Board of Directors, and shall have other duties as prescribed by the Board.

#### **VICE PRESIDENT**

Section 7. The Vice President shall, in the absence or disability of the President, perform the duties and exercise the powers of the President and shall perform such other duties and have such other powers as the Board of Directors may from time to time prescribe.

#### **EXECUTIVE DIRECTOR**

Section 8. The Executive Director shall be the executive officer of the Association and each of its Sections, shall have



general and active management of the activities and the business of the Association and shall see that all orders and resolutions of the Board of Directors are carried into effect.

The Executive Director shall execute bonds, mortgages and other contracts requiring the seal of the Association, except where required or permitted by law to be otherwise signed and executed and except where the signing and execution thereof shall be expressly delegated by the Board of Directors to some other officer or agent of the Association.

### **SECRETARY**

Section 9. The Secretary shall attend all meetings of the Board of Directors and all general meetings of the members and shall record all the proceedings in a book to be kept for that purpose. He shall give, or cause to be given, notice of all meetings of the members and special meetings of the Board of Directors, and shall perform such other duties as may be prescribed by the Board of Directors, under whose supervision he shall be. He shall have custody of the corporate seal of the Association and he shall have authority to affix the same to any instrument requiring it and, when so affixed, it may be attested by his signature. The Board of Directors may give general authority to any other officer to affix the seal of the Association and to attest the affixing by his signature.

### **TREASURER**

Section 10. The Treasurer shall have the custody of the Association's funds and securities and shall keep full and accurate accounts of receipts and disbursements in books belonging to the Association and shall deposit all monies and other valuable effects in the name and to the credit of the Association in such depositories as may be designated by the Board of Directors.

Section 11. He shall disburse the funds of the Association as may be ordered by the Board of Directors, taking proper vouchers for such disbursements, and shall render to the Board of Directors at its regular meetings, or when the Board of Directors or the President so require, an account of all his transactions as Treasurer and of the financial condition of the Association.

Section 12. If required by the Board of Directors, he shall give the Association a bond in such sum and with such surety or sureties as shall be satisfactory to the Board of Directors for the faithful performance of the duties of his office and for the restoration to the Association, in case of his death, resignation, retirement or removal from office, of all books, papers, vouchers, money and other property of whatever kind in his possession or under his control belonging to the Association.

### **SECTION CHAIRMEN**

Section 13. The persons elected as Section Chairmen shall be the chief spokesmen for each respective Section of the Association, and shall serve on the Board of Directors of the Association representing the Sections which elected them.

### **SECTION VICE CHAIRMEN**

Section 14. The persons elected as Section Vice Chairmen shall, in the absence or disability of the respective Section Chairmen, be the chief spokesmen for each respective Section of the Association. The Section Vice Chairmen also serve on the Board of Directors of the Association representing the Sections which elected them.

## **Article XIII GENERAL PROVISIONS**

Section 1. All checks or demands for money and notes of the Association shall be signed by such officer or officers or such other person or persons as the Board of Directors may from time to time designate.

Section 2. The fiscal year of the Association shall be fixed by Resolution of the Board of Directors.

Section 3. The Association seal shall have inscribed thereon the name of the Association, the year of its organization and the words "Corporate Seal, Colorado". The seal may be used by causing it or a facsimile thereof to be impressed or affixed or in any manner reproduced.

Section 4. The Association will not adopt or publicize any specific or generalized endorsement or non-endorsement of any computer vendor, supplier, product or service. No member is authorized to represent that the Association is recommending or suggesting the use of any particular computer vendor, supplier, product or service. Notwithstanding the above, the Association shall be authorized to disseminate information and reports concerning such vendors, products and services.

## **Article XIV AMENDMENTS**

Section 1. These By-Laws may be amended or repealed, or new By-Laws may be adopted, at (1) any regular or special meeting of members at which a quorum is present or represented by the vote of the members entitled to vote in the election of any Director, or at (2) a meeting of the Board of Directors by vote of a majority of such Board at which a quorum is present or represented, provided notice of the proposed alteration, amendment, or repeal, be contained in the notice of such Board meeting.



## IMPACT PRINTING TERMINALS

Agile Corporation		
AGILE MODEL A1 .....	XI.020	
AGILE MODEL A2 .....	XI.021	
Ahearn and Soper Limited		
MULTIWRITER III .....	XI.040	
American Telephone & Telegraph Co.		
33 KSR TELETYPEWRITER .....	XI.060	
35 KSR TELETYPEWRITER .....	XI.061	
43 TELEPRINTER .....	XI.062	
<b>American Terminal Leasing*</b>		
DECwriter II - LA36 .....	XI.070	
DECwriter III - LA120 .....	XI.071	
DIABLO 1620-3 .....	XI.072	
TTY43 .....	XI.073	
Anderson Jacobson, Inc.		
AJ 832 .....	XI.080	
AJ 860 .....	XI.081	
Applied Computer Systems		
SA300 .....	XI.100	
Dataroyal, Inc.		
7000 SERIES .....	XI.120	
Data Terminals & Communications		
DTC-382 with CRT .....	XI.140	
Digital Equipment Corporation		
LA34 DECwriter IV .....	XI.160	
LA36 DECwriter II .....	XI.161	
LA120 DECwriter III .....	XI.162	
Extel Corporation		
B 208 .....	XI.180	
B 318 .....	XI.181	
<b>General Electric Company</b>		
TERMINET 30 MATRIX PRINTER .....	XI.200	
TERMINET 200 MATRIX PRINTER .....	XI.201	
TERMINET 300 PRINTER .....	XI.202	
TERMINET 1200 PRINTER .....	XI.203	
TERMINET 1232 PRINTER .....	XI.204	
Hewlett-Packard Company		
2635A .....	XI.210	
2639A .....	XI.211	
NEC Information Systems, Inc.		
5520 KSR "SPINWRITER" .....	XI.220	
Olivetti Corporation of America		
TC 485 KSR .....	XI.240	
Perkin-Elmer Terminals Division		
CAROUSEL 310 TERMINAL PRINTER .....	XI.260	
CAROUSEL 350 TERMINAL PRINTER .....	XI.261	
Qume Corporation		
S5/45, S5/55 .....	XI.280	
Randal Data Systems, Inc.		
LA 36 DECwriter II .....	XI.300	
TEXTERM TERMINALS .....	XI.301	
LA 120 DECwriter III .....	XI.302	
LA 34 DECwriter IV .....	XI.303	
Tally Corporation		
T-1612 TELEPRINTER .....	XI.320	
Teletype Corporation		
MODEL 43 TELEPRINTER .....	XI.340	
Texas Instruments Incorporated		
OMNI 800 MODEL 820 KSR .....	XI.360	
<b>Trendata Corporation</b>		
TRENDATA 300 .....	XI.380	
TRENDATA 4000A .....	XI.381	
TRENDATA 4740 .....	XI.382	
Vardon & Associates, Inc.		
ENVAX SYSTEM 1043/S .....	XI.400	
<b>Western Union Data Services</b>		
EDT 33 .....	XI.420	
EDT 300 .....	XI.421	
EDT 1232 .....	XI.422	
Xerox Corporation		
1700 COMMUNICATIONS TERM. ....	XI.440	
1720 COMMUNICATIONS TERM. ....	XI.441	
1750 COMMUNICATIONS TERM. ....	XI.442	
1760 COMMUNICATIONS TERM. ....	XI.443	

\*Companies shown in **bold print** are Corporate Associate Members of ATSU.



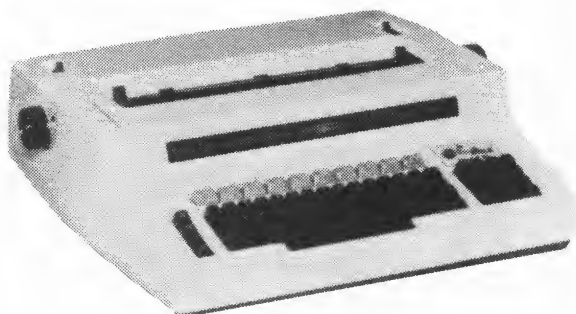
Company Name **AGILE CORPORATION**

Headquarters Address **1050 Stewart Dr., Sunnyvale, CA 94086**

Headquarters Contact **Nick Sackerson, Sales Mgr.** Telephone Number: **(408) 735-9904**

**Key Features**Model: **AGILE MODEL A-1**

Printing Technique	Daisy wheel
Printing Speed (Characters/Second)	35, 45 or 55cps
Maximum Characters Per Line	132/10 pitch, 158/12 pitch
Lower Case Available	Yes
Forms Feed Method	Friction, tractor, pin, sheet
Transmission Code	USASCII Correspondence
Internal Buffer	256 characters (opt to 4K)
Weight	65 lbs.
Purchase Cost (With Coupler)	\$ 3,755
Monthly Cost for Service Contract	\$ 35
Monthly Cost for One Year Lease (With Service)	\$ 140
Monthly Cost for Three Year Lease (With Service)	\$ 130
Year Introduced	1977
Approximate Number Installed	500
Serviced By	Direct and factory supported third party

**General Description**

The AGILE MODEL A-1 offers print quality equal to camera ready copy. The A-1 has full upper and lower case, all keys have adjustable repeat standard shift and all caps key. Features include vertical and horizontal tabing, also absolute tabing. Also variable left and right margin, variable page length 10 & 12 pitch, 6 & 8 lines per inch and proportional spacing. There are approximately 70 different print fonts available including APL, prestige elite, word processing, proportional spaced, scientific, Pica, Courier, Gothic, Documastary and foreign language. Both carbon and cloth ribbons, multiple colors available special order.

The AGILE A-1 has graphics capabilities both plot and super plotting. The A-1 runs on Calcomp compatible software and Agile offers a Calcomp compatible software package. The optional text justification mode with word wrap around allows a raw data source to be justified in single or dual column. The optional transparency mode allows all control codes and escape sequences to be printed by the terminal for trouble shooting software. The A-1 is full ASCII and optional APL keyboard is available. There are over thirty five different firmware options available. Most have been developed for customer applications, special firmware will be developed where there is no existing options to do the job. Agile will custom configure a single terminal. The standard terminal operates at 300 baud/1200 baud (xon - xoff) and optional baud rates are available from 110 to 9600 baud including IBM 2741 & IBM 3767. There is optional memory of up to 4K.

Date: **March, 1979**Submitted By: **Nick Sackerson, Sales Manager**





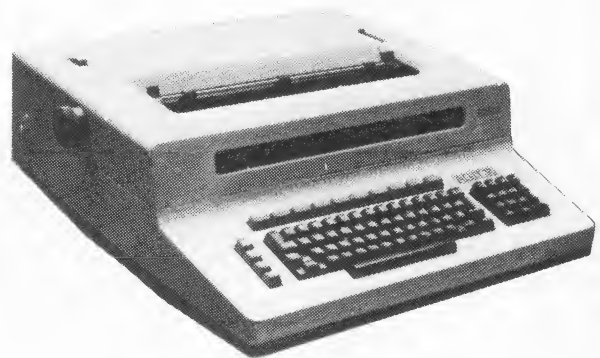
Company Name **AGILE CORPORATION**

Headquarters Address **1050 Stewart Drive, Sunnyvale, CA 94086**

Headquarters Contact **Nick Sackerson** Telephone Number: **(408) 735-9904**

**Key Features**

Printing Technique	Daisy Wheel
Printing Speed (Characters/Second)	55
Maximum Characters Per Line	132/10, 158/12
Lower Case Available	Yes
Forms Feed Method	Friction or Tractor
Transmission Code	USASCII or EBCDIC
Internal Buffer	65,000 char.
Weight	50 lbs.
Purchase Cost (With Coupler)	\$ 3,675
Monthly Cost for Service Contract	\$ 35
Monthly Cost for One Year Lease (With Service)	\$ 140
Monthly Cost for Three Year Lease (With Service)	\$ 130
Year Introduced	1978
Approximate Number Installed	n.a.
Serviced By	Agile Corp.

Model: **AGILE MODEL A-2****General Description**

The A-2 terminal is a table top model, with optional roll-away stand. It uses the Diablo daisy wheel print mechanism, in either plastic wheel, or metal wheel word processing versions. The terminal comes with switchable baud rates of 300 and 1200 standard, and may optionally use baud rates up to 9600. Other options include full internal text justification with proportional spacing and word wrap-around, super-plotting mode using CalComp plot software, cut paper feeder, pinfeed platen, APL font and keyboard, and IBM 2741 or 3767 modes.

Company Name	AHEARN AND SOPER LIMITED		
Headquarters Address	31 Enterprise Road, Rexdale, Ontario, M9W 1C4, CANADA		
Headquarters Contact	Verne Campbell	Telephone Number:	(416) 245-4848

## Key Features

Printing Technique	:	Daisy Wheel
Printing Speed (Characters/Second)	:	45 Characters/Second
Maximum Characters Per Line	:	132/158 10 or 12 pitch
Lower Case Available	:	Standard
Forms Feed Method	:	Bi-directional forms tractor
Transmission Code	:	ASCII
Internal Buffer	:	768 char. std., 3K optional
Weight	:	45 lbs.
Purchase Cost (With Coupler)	:	\$ 4,500
Monthly Cost for Service Contract	:	\$ 40
Monthly Cost for One Year Lease (With Service)	:	\$ 168
Monthly Cost for Three Year Lease (With Service)	:	\$ 144
Year Introduced	:	1976
Approximate Number Installed	:	400
Serviced By	:	Ahearn and Soper Limited

Model: MULTIWRITER III



## General Description

The MULTIWRITER III is a serial, ASCII, Impact terminal utilizing the Diablo Hytype II print mechanism with interchangeable plastic printwheels.

An optional heavy-duty printer utilizing metal printwheels is available for word processing application.

Print optimization and automatic reverse printing are automatic and supported by a number of stop/start protocols for high-speed operation.

Date: March, 1979

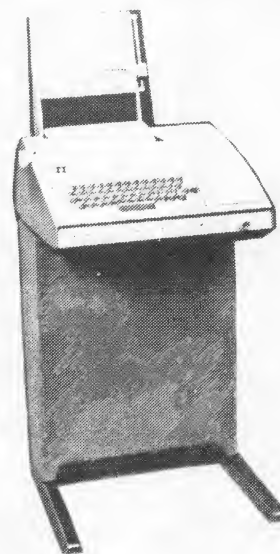
Submitted By: Verne Campbell, Product Manager

Company Name	AMERICAN TELEPHONE & TELEGRAPH COMPANY		
Headquarters Address	295 N. Maple Av., Basking Ridge, N.J. 07920		
Headquarters Contact	Mr. W. J. Ausura	Telephone Number:	(201) 221-6246

## Key Features

Printing Technique	Impact-Cylindrical Wheel
Printing Speed (Characters/Second)	10
Maximum Characters Per Line	72
Lower Case Available	No
Forms Feed Method	Sprocket (Pin) or Friction
Transmission Code	ASCII
Internal Buffer	No
Weight	40 lbs.
Purchase Cost (With Coupler)	\$
Monthly Cost for Service Contract	\$ Consult Local Bell
Monthly Cost for One Year Lease (With Service)	\$ Telephone Co.
Monthly Cost for Three Year Lease (With Service)	\$
Year Introduced	1962
Approximate Number Installed	n.a.
Serviced By	Bell Telephone Co.'s

Model: 33 KSR Teletypewriter



## General Description

The 33 KSR Teletypewriter is an extremely simple to operate, low-cost data terminal designed to operate over the switched telephone network or point-to-point private line facilities. Available configurations feature various combinations of keyboard data entry and printed page copy options.

Terminals can be either sprocket fed (1 original/2 carbon copies) or friction fed (1 original/1 carbon copy). Paper width is 8½ inches. Speed is 110 Baud. Standard ASCII keyboard with upper case characters is provided. Non-printing control characters are also provided. Terminals are factory adjusted for 72 character line, with 10-to-the-inch horizontal spacing. Line spacing is adjustable to single or double line. Various paper handling devices are available as separate accessories.

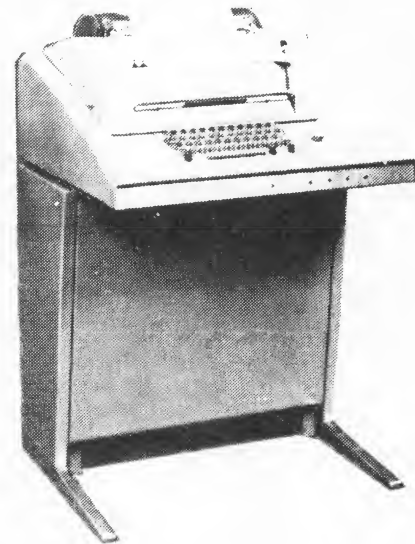
A standard Bell System 100 Series data set and telephone are required for the configuration. All terminals have half or full duplex option.

Company Name	AMERICAN TELEPHONE & TELEGRAPH COMPANY		
Headquarters Address	295 N. Maple Ave., Basking Ridge, N.J. 07920		
Headquarters Contact	Mr. W. J. Ausura	Telephone Number:	(201) 221-6246

## Key Features

Printing Technique	Impact-Typebox/Type Pallet
Printing Speed (Characters/Second)	10
Maximum Characters Per Line	72
Lower Case Available	No
Forms Feed Method	Sprocket (Pin) or Friction
Transmission Code	ASCII
Internal Buffer	No
Weight	136 lbs.
Purchase Cost (With Coupler)	\$
Monthly Cost for Service Contract	\$ Consult Local Bell
Monthly Cost for One Year Lease (With Service)	\$ Telephone Co.
Monthly Cost for Three Year Lease (With Service)	\$
Year Introduced	1962
Approximate Number Installed	n.a.
Serviced By	Bell Telephone Co.'s

Model: 35 KSR Teletypewriter



## General Description

The 35 KSR is a heavy duty, low-cost data terminal designed to operate over the switched telephone network or point-to-point private line facilities. Various combinations of keyboard data entry and printed page copy options and accessories are available.

Terminals can be either sprocket (pin) fed with one original and up to seven carbon copies, or friction fed, with one original and up to two carbon copies. Both are for 8½ inch wide paper. Pin fed printers include vertical and horizontal tabulation with form feed capabilities. Speed is 110 Baud. Half or full duplex transmission is standard option.

Keyboard is upper case ASCII with additional non-printing control characters. The impact printers use an interchangeable typebox with interchangeable type pallets. Terminals are factory adjusted for a 72 character line and have 10 characters per inch horizontal spacing. Line spacing is adjustable to single or double line.

A standard Bell System 100 Series data set and telephone are required for the configuration.

Company Name	AMERICAN TELEPHONE & TELEGRAPH COMPANY		
Headquarters Address	295 N. Maple, Ave., Basking Ridge, N.J. 07920		
Headquarters Contact	Mr. W. J. Ausura	Telephone Number:	(201) 221-6246

## Key Features

Printing Technique	Dot Matrix
Printing Speed (Characters/Second)	10/30 cps
Maximum Characters Per Line	132
Lower Case Available	yes, std.
Forms Feed Method	Sprocket (Pin)
Transmission Code	ASCII
Internal Buffer	Yes, 64 characters
Weight	31 lbs.
Purchase Cost (With Coupler)	\$
Monthly Cost for Service Contract	\$ Consult Local Bell
Monthly Cost for One Year Lease (With Service)	\$ Telephone Co.
Monthly Cost for Three Year Lease (With Service)	\$
Year Introduced	1976
Approximate Number Installed	n.a.
Serviced By	Bell Telephone Co's.

Model: 43 Teleprinter



## General Description

Quiet and compact, the 43 Teleprinter is designed to operate over the telephone network. It includes features to satisfy a broad spectrum of today's business communication needs. The Bell Telephone Co. of Pennsylvania and Pacific Northwest Bell Tel. Co. also offer this terminal on a point-to-point private line basis.

Print quality is exceptionally crisp and easy to read. Characters are formed by a long-life 9-wire impact printhead using a combination of up to 7 out of 9 dots vertically and up to 4 dots horizontally.

The pin feed 43 prints up to a 132 character line at 13 characters per inch on 12" wide by 8 1/2" long fanfold paper. This becomes handy 11 x 8 1/2" when the 1/2" serrated margins are removed, a convenient size for reproducing and storing using standard office equipment. An original and two carbon copies are provided.

When sending or receiving, the model 43 delivers optimum throughput. The buffered, light-touch keyboard permits users to type as fast as skills permit. Incoming data is at true transmission speeds because functions such as carriage return and line feed do not require fill characters for timing. It's all handled very efficiently by a receive buffer and the printer's catch-up capability.

Features include (for dial-up version only): operator selectable 10 or 30 char/sec transmission in either the half or full duplex mode with parity detection on or off, full ASCII upper and lower-case data entry and print-out capability, built-in diagnostics with an integrated 103 type data set (dial up version only). All terminals include operator controls for Talk, Data and Automatic Answer.

Date: March, 1979

Submitted By: W.J. Ausura, Staff Associate



Company Name **AMERICAN TERMINAL LEASING**

Headquarters Address **P.O. Box 68, Kenmore Station, Boston, MA 02215**

Headquarters Contact **Dick Noonan/George Troy** Telephone Number: **(617) 261-1100**

**Key Features**

Printing Technique : **7 x 7 Dot Matrix**

Printing Speed (Characters/Second) : **30 char/sec**

Maximum Characters Per Line : **132**

Lower Case Available : **Yes**

Forms Feed Method : **Tractor Feed**

Transmission Code : **ASCII**

Internal Buffer : **16 char. buffer storage**

Weight : **102 lbs**

Purchase Cost (With Coupler) : **\$ n.a.**

Monthly Cost for Service Contract : **\$ 19.00**

Monthly Cost for One Year Lease (With Service) : **\$ 80.00**

Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**

Year Introduced : **1974**

Approximate Number Installed : **n.a.**

Serviced By : **Digital Equipment Corp**

Model: **DECwriter II - LA36****General Description**

The DECwriter II is a fast, small, quiet 300-baud interactive hard copy terminal. It functions as an economical, remote or local hard copy input/output device to a host computer. Priced competitively with comparable printer terminals. DECwriter II features improved throughput, reliability, print quality, and forms handling versatility. It is a true 30 characters per second printer—yet it is so quiet that it can readily be used in an office environment. Measured exterior noise level is no more than 65 dB at 30 feet.

DECwriter II achieves its 30 cps throughput by having a 16-character buffer storage receiving coming data. This buffer stores characters during printing, carriage return, and line feed. When there is more than one character in the buffer, the terminal automatically switches to a 60 cps catch-up printing operation until all characters are printed. Thus DECwriter II makes full use of a 300-baud communications line.

American Terminal Leasing offers the DECwriter II for immediate delivery on a 90-day minimum lease. The terminal may then be leased on month-to-month basis. Lower rates are available on one-year leases. Nationwide maintenance and installation plans will be tailored to your requirements.

American Terminal Leasing will be offering the new LA34 light weight terminal in February, 1979. Call for details.

Date: **March, 1979**Submitted By: **Dick Noonan, Marketing Manager***William Grinker,*





**TERMINALS  
DIRECTORY**

## Impact Printing Terminals

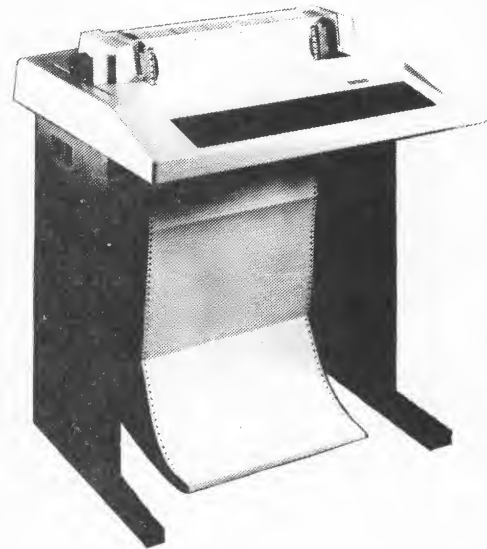
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Company Name : AMERICAN TERMINAL LEASING  
Headquarters Address : P.O. Box 68, Kenmore Station, Boston, MA 02215  
Headquarters Contact : Dick Noonan/George Troy Telephone Number: (617) 261-1100

### Key Features

Printing Technique	7 x 7 Dot Matrix
Printing Speed (Characters/Second)	180 cps
Maximum Characters Per Line	132
Lower Case Available	Standard
Forms Feed Method	Tractor Feed
Transmission Code	ASCII
Internal Buffer	Integral 1K char. buffer
Weight	107 lbs
Purchase Cost (With Coupler)	\$ 2,295*
Monthly Cost for Service Contract	\$ 25-28
Monthly Cost for One Year Lease (With Service)	\$ 125
Monthly Cost for Three Year Lease (With Service)	\$ n.a.
Year Introduced	1979
Approximate Number Installed	n.a.
Serviced By	Digital Equipment Corp.

Model: DECwriter III - LA120



### General Description

The LA120 DECwriter III is an enhanced version of LS120 DECwriter III with substantial upgrading of features. The terminal is now able to support transmission rates up to 9,600 baud. Improvements include smart bidirectional printing; adjustable character widths from condensed to double width, adjustable line spacing; and self-test diagnostic initiated at power-up. With the DECwriter III terminal, the operator's performance is optimized too. All options are set from the keyboard, using simple mnemonic commands and a prompting LED display. If you want to see what the option settings are at the moment, press the STATUS Key and the DECwriter III will produce a complete listing. Compatibility with Bell 103, 202, 212, and Vadic 3400 modems, gives the DECwriter III maximum communications efficiency on the dial network.

DECwriter III draws upon field-proven sub-assemblies used in other DIGITAL terminals. DECwriter III meets high standards of reliability, ease of maintenance and accuracy of DECwriter II and DECprinter.

American Terminal Leasing offers the DECwriter III for immediate delivery on a 90-day minimum lease. The terminal may then be leased on a month-to-month basis. Lower rates are available on one-year leases. Nationwide maintenance and installation plans will be tailored to your requirements.

\*Without Coupler.

Date: March, 1979

Submitted By: Dick Noonan, Marketing Manager



Company Name	AMERICAN TERMINAL LEASING		
Headquarters Address	P.O. Box 68, Kenmore Station, Boston, MA 02215		
Headquarters Contact	Dick Noonan	Telephone Number:	(617) 261-1100

**Key Features**

Printing Technique	Printwheel
Printing Speed (Characters/Second)	45 cps
Maximum Characters Per Line	158
Lower Case Available	Standard
Forms Feed Method	Tractor or Friction
Transmission Code	ASCII
Internal Buffer	64 char
Weight	48 lbs
Purchase Cost (With Coupler)	\$ 3,050
Monthly Cost for Service Contract	\$ 33
Monthly Cost for One Year Lease (With Service)	\$ 155
Monthly Cost for Three Year Lease (With Service)	\$ n.a.
Year Introduced	1974
Approximate Number Installed	
Serviced By	Sorbus Incorporated

Model: DIABLO 1620-3

**General Description**

Typewriter-quality printing and graphics versatility distinguish the Diablo 1620-3 Hytype communications terminals. The "Hyterm" interfaces with a pair of Bell-type 103A modems for communications over the telephone lines in switch-selectable full or half duplex operation.

The Diablo Hytype II printer mechanism enables users to select from a variety of available printwheels. All logic circuitry, including microprocessor and memory, power supply and keyboard are contained in an integral unit simplifying maintenance and trouble-shooting.

Complete printing flexibility is designed into the interface to take advantage of appropriate software. High-speed horizontal and vertical tabbing, backward printing and variable letter and line spacing are software programmable to make the effective print speeds and graphics capability significantly greater than found in competitive terminals.

American Terminal Leasing offers the Diablo 1620-3 for immediate delivery on a 90-day minimum lease. The terminal may then be leased on a month-to-month basis. Lower monthly rates are available on one-year leases. Nationwide maintenance and installation plans will be tailored to your requirements.

Company Name **AMERICAN TERMINAL LEASING**  
 Headquarters Address **P.O. Box 68, Kenmore Station, Boston, MA 02215**  
 Headquarters Contact **Dick Noonan** Telephone Number: **(617) 261-1100**  
*Sales Dept.*

**Key Features**

 Model: **TTY43**

Printing Technique	9 x 7 Dot Matrix
Printing Speed (Characters/Second)	10/30 cps
Maximum Characters Per Line	132
Lower Case Available	Standard
Forms Feed Method	Sprocket or Friction
Transmission Code	ASCII
Internal Buffer	64 char
Weight	31 lbs
Purchase Cost (With Coupler)	\$ 1,075 <i>N.O.</i>
Monthly Cost for Service Contract	\$ <del>18</del> <i>N.O.</i>
Monthly Cost for One Year Lease (With Service)	\$ <del>68</del> <i>*</i>
Monthly Cost for Three Year Lease (With Service)	\$ <i>n.a.</i>
Year Introduced	1977
Approximate Number Installed	
Serviced By	Teletype


**General Description**

Designed to operate over telephone network and point-to-point private line facilities, the Model 43 is Teletype Corporation's answer to today's business communications needs. Quiet, compact, and light-weight, this 9 x 7 Dot Matrix Teleprinter features 10 or 30 cps transmission in either half or full duplex mode. Other features include full ASCII upper & lower case data entry and print-out capability, multi-copy, and built-in diagnostics. A long-life 9-wire impact printhead produces exceptionally crisp easy-to-read characters.

Total economy is the key to the Model 43's success. The teleprinter is built with LSI circuitry which means few moving parts—less wear and tear. Power requirements are less than those needed by a 75-watt lightbulb. Troublefree maintenance is achieved through a modular construction comprised of 5 pluggable components. Each component has built-in test capability for immediate isolation and replacement of troubled parts. Downtime is virtually eliminated.

The pinfeed 43 is especially suited for standard business documentation on 8½ by 11 sheets including such items as purchase orders, invoices, and shipping papers.

American Terminal Leasing offers the Teletype 43 for immediate delivery on a 90-day minimum lease. The terminal may then be leased on a month-to-month basis. Lower monthly rates are available on one-year leases. Nationwide maintenance and installation plans will be tailored to your requirements.

Also available are the full line of ASR/KSR 33, 35, 37 teleprinters. Call for prices and deliver information.

\*(coupler \$235 additional)

*\* Prime offering is a three month lease at \$8/mo. immediate delivery.*

 Date: **March, 1979**

 Submitted By: **Dick Noonan, Marketing Manager**

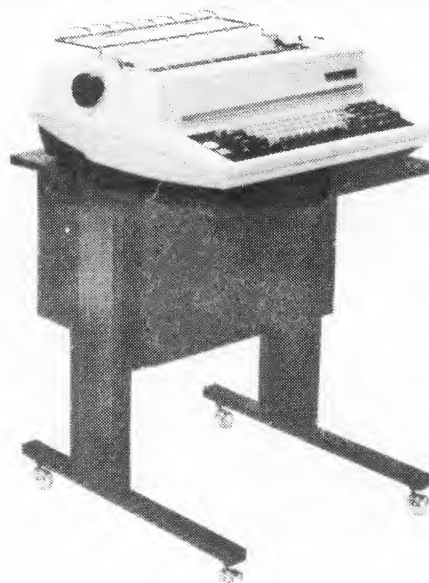
*William S. Gruber, President*

Company Name	APPLIED COMPUTER SYSTEMS		
Headquarters Address	617 No. Mary Ave., Sunnyvale, CA 94086		
Headquarters Contact	R. W. Copeland	Telephone Number:	(408) 733-3733

## Key Features

Model: SA300

Printing Technique	Daisy Wheel
Printing Speed (Characters/Second)	45 cps
Maximum Characters Per Line	158
Lower Case Available	Yes
Forms Feed Method	Friction, Pin Feed, Tractor
Transmission Code	ASCII
Internal Buffer	8K std., expandable to 64K
Weight	70 lbs.
Purchase Cost (With Coupler)	\$ 4,500*
Monthly Cost for Service Contract	\$ 30
Monthly Cost for One Year Lease (With Service)	\$ 221*
Monthly Cost for Three Year Lease (With Service)	\$ 162*
Year Introduced	1977
Approximate Number Installed	50
Serviced By	Applied Computer Systems



## General Description

The SA300 is a wide carriage interactive data terminal that utilizes the plastic daisy or metal wheel printer. This impact printer produces high-quality print in 132/158 columns at 45 cps. The SA300 utilizes a microprocessor and through advanced design of both hardware and software makes internal computing capability available to the user which allows the user to create their own programs and download it to the SA300 via the terminals communication port. The terminal is standard with 8K of RAM memory, expandable to 64K.

Other features include: Program selectable proportional spacing, selectable baud rates from 110 to 9600, additional communication ports, RS-232C interface, ETX/ACK line protocol, plot capability.

\*Prices quoted do not include coupler

Date: March, 1979

Submitted By: C. Lauterbach, Product Manager

Company Name	DATAROYAL, INC.		
Headquarters Address	:	235 Main Dunstable Rd., Nashua, NH 03060	
Headquarters Contact	:	Alfred J. Falco	Telephone Number: (603) 883-4157

## Key Features

Printing Technique	:	Dot Matrix
Printing Speed (Characters/Second)	:	120-150 cps
Maximum Characters Per Line	:	132
Lower Case Available	:	No
Forms Feed Method	:	Tractor or Pln Feed
Transmission Code	:	2848, Serial or Parallel
Internal Buffer	:	2 line optional
Weight	:	65 lbs.
Purchase Cost (With Couplar)	:	\$ *
Monthly Cost for Service Contract	:	\$ 45.00
Monthly Cost for One Year Lease (With Service)	:	\$ n.a.
Monthly Cost for Three Year Lease (With Service)	:	\$ n.a.
Year Introduced	:	1975
Approximate Number Installed	:	n.a.
Serviced By	:	Dataroyal, RCA Customers

Model: 7000 SERIES



## General Description

The Dataroyal IPS-7000 Series is a family of over 60 printer models based on a single, simple, reliable mechanism. The versatile built-in microcomputer and the high degree of modularity inherent in the IPS-7000, allow it to be configured for a wide range of text printing, label-printing, and graphics applications. In addition, the IPS-7000 Series offers several interfaces parallel I/O plug compatible with many vendors serial I/O (EIA, CCITT, TTL, & 20 ma) Also, industry compatible forms control bidirectional paper motion, 2 or 12 channel. A selection of fonts including european and katakana.

### Optional features

- Keyboard display for both standard and interactive use,
- Character and block validity checking.

These printers can be re-programmed to fit your requirements.

\*Purchase cost depends on Model.

Company Name	Digital Equipment Corporation, Terminals Product Line		
Headquarters Address	1 Iron Way, Marlboro, MA 01752		
Headquarters Contact	Mr. John Wolaver	Telephone Number:	(617) 481-7400

## Key Features

Printing Technique	:	9 x 7 Dot Matrix
Printing Speed (Characters/Second)	:	30 cps
Maximum Characters Per Line	:	132
Lower Case Available	:	Yes (Standard)
Forms Feed Method	:	Sheet or Roll *
Transmission Code	:	ASCII
Internal Buffer	:	130
Weight	:	25 lbs.
Purchase Cost (With Coupler)	:	\$ 1,450
Monthly Cost for Service Contract	:	\$ n.a.
Monthly Cost for One Year Lease (With Service)	:	\$ n.a.
Monthly Cost for Three Year Lease (With Service)	:	\$ n.a.
Year Introduced	:	1978
Approximate Number Installed	:	n.a.
Serviced By	:	Digital Field Service and a number of independent companies

Model: LA34 DECwriter IV



## General Description

The LA 34 DECwriter IV is a 300 baud, 30 cps desk-top terminal that can print at burst speeds up to 45 characters per second. An alternate rate of 110 baud is keyboard selectable. The terminal can operate full duplex, or full duplex with local echo.

The terminal features clear, crisp character registration from its 9 x 7 dot matrix impact print head. Character width ranges from 10 to 16.5 characters per inch. Vertical spacing is variable from 6 lines per inch to 12 lines per inch.

The terminals roll platen accepts single sheet or roll feed paper. Tractor are available as an option. Tabs and margins are also standard.

\*Tractors optional

Date: March, 1979

Submitted By: Roger Bentley, Terminals Advertising Manager

x-6085



Company Name **Digital Equipment Corporation, Terminals Product Line**

Headquarters Address **1 Iron Way, Marlboro, MA 01752**

Headquarters Contact **Mr. Bernard W. Lee**

Telephone Number: **(617) 481-7400**

## Key Features

Printing Technique	7 x 7 Dot Matrix
Printing Speed (Characters/Second)	30; 60 in catchup mode
Maximum Characters Per Line	132
Lower Case Available	Yes (Standard)
Forms Feed Method	Tractor Feed
Transmission Code	ASCII
Internal Buffer	1
Weight	102 lbs.
Purchase Cost (With Coupler)	\$ 2
Monthly Cost for Service Contract	\$ 2
Monthly Cost for One Year Lease (With Service)	\$ 2
Monthly Cost for Three Year Lease (With Service)	\$ 2
Year Introduced	1974
Approximate Number Installed	100,000
Serviced By	Digital Field Service and a number of independent companies

Model: **LA36 DECwriter II**



## General Description

The LA36 DECwriter II is an advanced-technology teleprinter designed to offer fast, reliable operation with the best price/performance ratio of any 30-cps teleprinter in the industry. The DECwriter II is equally at home in communications applications or computer console applications.

The DECwriter II is loaded with many practical functional and operator features. Among these are the true 30-cps throughput accomplished by a 60-cps catchup mode which is activated any time more than one character is present in the 16-character buffer. Also featured are quiet 48 db operation, infinitely variable vertical forms adjustment, variable width, up to six part forms handling and countless other features.

The integral stand design always provides correct height for easy operator use of the typewriter-style keyboard. Optional features include integral modems and couplers, forms handling, communications options, and ASR buffers.

<sup>1</sup>16 character FIFO: 4-16 K character ASR buffers optional.

<sup>2</sup>Available from Digital's Components Group in quantity. Also may be leased, rented or purchased in smaller quantities from independent companies.

Company Name : Digital Equipment Corporation, Terminals Product Line

Headquarters Address : 1 Iron Way, Marlboro, MA 01752

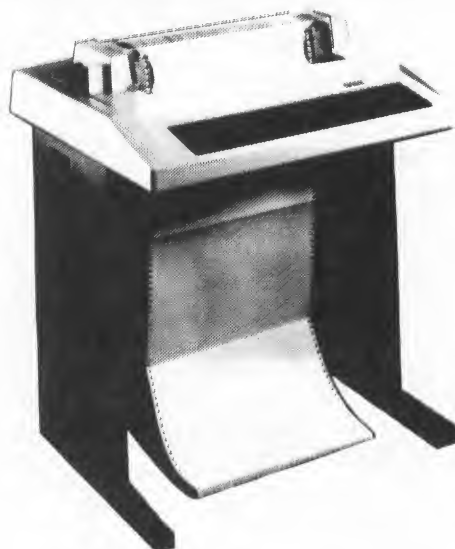
Headquarters Contact : Mr. Paul Preo

Telephone Number: (617) 481-7400

## Key Features

Printing Technique	:	7 x 7 Dot Matrix
Printing Speed (Characters/Second)	:	180
Maximum Characters Per Line	:	217
Lower Case Available	:	Yes (Standard)
Forms Feed Method	:	Tractor Feed
Transmission Code	:	ASCII
Internal Buffer	:	1
Weight	:	107 lbs.
Purchase Cost (With Coupler)	:	\$ 2,600
Monthly Cost for Service Contract	:	\$ 2
Monthly Cost for One Year Lease (With Service)	:	\$ 2
Monthly Cost for Three Year Lease (With Service)	:	\$ 2
Year Introduced	:	1978
Approximate Number Installed	:	n.a.
Serviced By	:	Digital Field Service and a number of independent companies

Model: LA120 DECwriter III



## General Description

The LA 120 DECwriter III is designed for use in 1200 baud communications. A high throughput rate is achieved through the use of smart, bidirectional 180 cps printing and fast print head movement over white space. Communication rates are keyboard or host selectable up to 9600 baud in any of five half or full duplex modes.

The terminal prints variable size characters, ranging from 5.6 to 16.5 characters per horizontal inch. Vertically, the terminal can print 2 to 12 lines per inch. These characteristics, as well as top, bottom, left and right margins, 217 horizontal tabs and 168 vertical tabs can be selected from the keyboard. In all, more than 45 terminal attributes can be established from the keyboard or from the host computer. The terminal also includes automatic self-test diagnostics and non-volatile RAM to store terminal set-up characteristics.

<sup>1</sup>1K character FIFO buffer standard. 4K character optional.

<sup>2</sup>Available from Digital's Components Group in quantity. Also may be leased, rented or purchased in smaller quantities from independent companies.

Date: March, 1979

Submitted By: Roger Bentley, Terminals Advertising Manager



Company Name : **EXTEL CORPORATION**

Headquarters Address : **3005 MacArthur Blvd., Northbrook, IL 60062**

Headquarters Contact : **Sales Department** Telephone Number: **(312) 291-2550**

**Key Features**

Printing Technique : **Impact Matrix Print Head**

Printing Speed (Characters/Second) : **Up to 30 cps**

Maximum Characters Per Line : **80**

Lower Case Available : **Yes**

Forms Feed Method : **Friction**

Transmission Code : **USASCII**

Internal Buffer : **Yes, 128 char.**

Weight : **34 lbs.**

Purchase Cost (With Coupler) : **\$ 2270\***

Monthly Cost for Service Contract : **\$ 36.25**

Monthly Cost for One Year Lease (With Service) : **\$ 100**

Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**

Year Introduced : **1975**

Approximate Number Installed : **n.a.**

Serviced By : **Teleprinter Leasing Corp.**

Model: **B 208 L****General Description**

The Model B 208 L Keyboard Send/Receive Terminal is a totally solid-state, electronically-controlled tabletop unit, designed to satisfy general purpose switched network applications. The unit is housed entirely in one module of contemporary styling which blends well with any office decor. Its small size and extremely low operating noise level further enhance its adaptability to general office areas.

The long life expectancy and reliability of the machine's computer-style control circuitry mean that the terminal is well suited for heavy-duty applications.

The keyboard has been arranged similar to that of a standard electric typewriter so that little training time should be required for new operators.

The printer portion of the terminal provides a 5 x 7 dot matrix printout on either standard teleprinter paper or pressure sensitive paper. The standard machine includes a ribbon mechanism, utilizing a 1/2-inch nylon ribbon which reverses automatically and can be changed without tools. Access to control switches, the typing unit, and internal components is convenient and easy.

The unit can be easily characterized to the individual user's specifications by the installer or serviceman.

\*Price shown does not include coupler.

Date: **March, 1979**Submitted By: **George W. Fink, Senior Applications Engineer***Larry Lorenz, Adver. Mgr.*

Company Name : **EXTEL CORPORATION**  
 Headquarters Address : **3005 MacArthur Blvd., Northbrook, IL 60062**  
 Headquarters Contact : **Sales Department** Telephone Number: **(312) 291-2550**

## Key Features

 Model: **B 318**

Printing Technique	: Impact-Matrix Print Head
Printing Speed (Characters/Second)	: Up to 30 cps
Maximum Characters Per Line	: 80
Lower Case Available	: Yes
Forms Feed Method	: Friction
Transmission Code	: USACII
Internal Buffer	: Yes, 128 char.*
Weight	: 36 lbs.
Purchase Cost (With Coupler)	: \$ 3500**
Monthly Cost for Service Contract	: \$ n.a.
Monthly Cost for One Year Lease (With Service)	: \$ 140
Monthly Cost for Three Year Lease (With Service)	: \$ n.a.
Year Introduced	: 1975
Approximate Number Installed	: n.a.
Serviced By	: Teleprinter Leasing Corp.



## General Description

An internal editable memory ASR in contemporary office styling. Extel's Model 318 SWL is a versatile, heavy duty send receive terminal, suitable for TWX and dataphone applications, smaller and quieter than most office typewriters.

An internal, solid state memory with full editing package permits the high speed preparation and transmission of error free messages at speeds up to 30 cps. Multi copy impact printing using standard paper and ribbons.

Standard switch options covering any three line speeds, 64/96/238 character set, line spacing, parity, FDX/HDX, etc. are augmented by a variety of additional keyboard programmable features in this powerful, versatile terminal.

Modular construction, latest state of the art microprocessor electronics and a well proven typing unit ensure the ultimate in performance, reliability and serviceability.

RS232 Interface is standard, plug compatible with most acoustic couplers and data sets. High level polar or neutral interfaces also available.

\*Plus, up to 8K character editable memory.

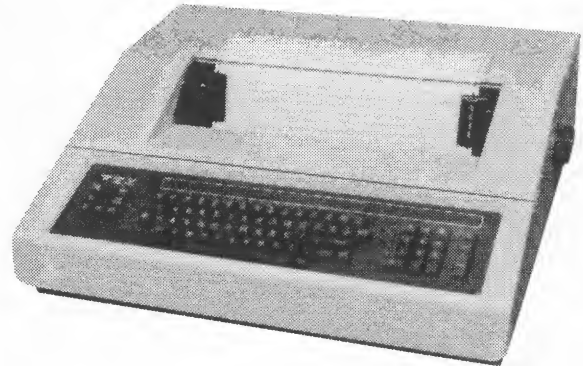
\*\*Price shown includes internal 103 style modem with dual line ports for TWX/DDO, DDO/DDO or TWX/TWX.

Company Name : HEWLETT-PACKARD COMPANY  
 Headquarters Address : P.O. Box 15, 11311 Chinden Blvd., Boise, ID 83707  
 Headquarters Contact : Bill Murphy Telephone Number: (208) 376-6000

## Key Features

Model: 2635A

Printing Technique : 7 x 9 dot matrix  
 Printing Speed (Characters/Second) : 180  
 Maximum Characters Per Line : 68, 136, 227  
 Lower Case Available : Standard  
 Forms Feed Method : Tractor  
 Transmission Code : ASCII  
 Internal Buffer : 229 Characters  
 Weight : 56 lbs.  
 Purchase Cost (With Coupler) : \$ 3,450\*  
 Monthly Cost for Service Contract : \$ 31  
 Monthly Cost for One Year Lease (With Service) : \$ 181\*  
 Monthly Cost for Three Year Lease (With Service) : \$ 149\*  
 Year Introduced : 1977  
 Approximate Number Installed : n.a.  
 Serviced By : Hewlett-Packard



## General Description

The HP 2635A Printing Terminal utilizes microprocessor-based electronics to optimize throughput, data manipulation and other control functions. A "smart printing" algorithm allows the HP 2635A to delete leading and trailing blanks, to skip at high speed over 10 or more embedded blanks, and to "look ahead" at the next line to determine the most efficient print direction (left to right or right to left).

Three print sizes (5, 10 and 16.7 characters per inch) are program selectable. Variable line spacing allows further flexibility in printing. The 7 x 9 dot matrix character formation allows clear, crisp copy on up to six-part forms.

In addition to its printing features, the 2635A also has, as standard, a typewriter-like keyboard and an accounting-type numeric keyboard including TAB and ENTER keys.

EIA RS232C and 20 MA current loop interfaces are available. For RS232C operation, transmission speeds from 110 baud to 9600 baud are switch-selectable. The user may optionally add 202-type modem control to the RS232C interface.

\*Purchase and lease prices do not include prices for acoustic coupler. Coupler not available from Hewlett-Packard.

Date: May, 1979

Submitted By: Steve Davis, Marketing Engineer

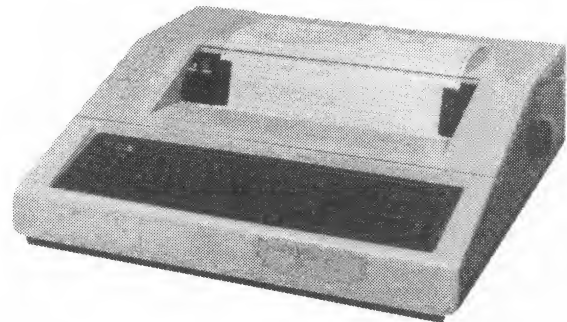


Company Name : HEWLETT-PACKARD COMPANY  
Headquarters Address : P.O. Box 15, 11311 Chinden Blvd., Boise, ID 83707  
Headquarters Contact : Bill Murphy Telephone Number: (208) 376-6000

**Key Features**

Printing Technique : 7 x 9 dot matrix  
Printing Speed (Characters/Second) : 180  
Maximum Characters Per Line : 68, 136, 227  
Lower Case Available : Standard  
Forms Feed Method : Tractor  
Transmission Code : ASCII  
Internal Buffer : 1000 Characters  
Weight : 56 lbs.  
Purchase Cost (With Coupler) : \$ 4,025\*  
Monthly Cost for Service Contract : \$ 31  
Monthly Cost for One Year Lease (With Service) : \$ 211\*  
Monthly Cost for Three Year Lease (With Service) : \$ 169\*  
Year Introduced : 1978  
Approximate Number Installed : n.a.  
Serviced By : Hewlett-Packard

Model: 2639A

**General Description**

- High throughput
- Printing versatility
- Flexible serial data communications
- Long life cartridge ribbon

The 2639A combines all the print speed and versatility features of the 2635A, plus adds extensive serial data communications capability. This will enable the 2639A to be easily used with many different host CPU's, over full or half duplex modems, without loss of data.

The 2639A is an excellent alternative for a local or remote data entry, transaction, or program development terminal. Its print speed and versatility make it an excellent selection for use as a remote print station.

\*Purchase and lease prices do not include price of acoustic coupler. Coupler not available from Hewlett-Packard.

Date: May, 1979

Submitted By: Steve Davis, Marketing Engineer



Company Name **NEC INFORMATION SYSTEMS, INC.**

Headquarters Address **5 Militia Drive, Lexington, MA 02173**

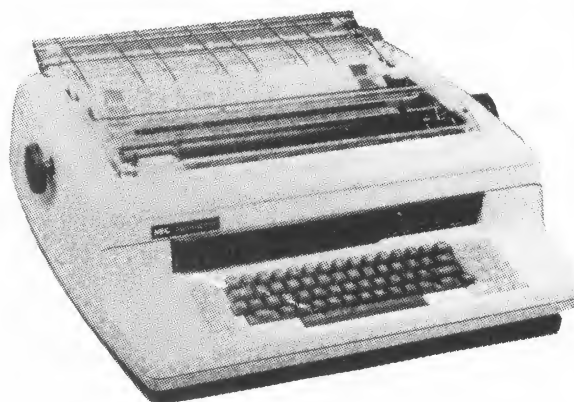
Headquarters Contact **Jack Flynn/Bruce Thatcher**

Telephone Number: **(617) 862-3120**

## Key Features

Printing Technique	Impact, Print "Thimble"
Printing Speed (Characters/Second)	55 CPS
Maximum Characters Per Line	136
Lower Case Available	Yes
Forms Feed Method	Friction/Tractor/Pin Feed
Transmission Code	ASCII
Internal Buffer	256 Characters
Weight	51.1 lbs.
Purchase Cost (With Coupler)	\$ 3,090
Monthly Cost for Service Contract	\$ 37.50
Monthly Cost for One Year Lease (With Service)	\$ n.a.
Monthly Cost for Three Year Lease (With Service)	\$ n.a.
Year Introduced	1977
Approximate Number Installed	n.a.
Serviced By	NEC Information Systems Dow Jones Service Co.

Model: **5520 KSR "SPINWRITER" TERMINAL**



## General Description

**GENERAL** - NEC Information Systems' new Model 5510 Receive Only and Model 5520 Keyboard Send/Receive SPINWRITER terminals are microprocessor controlled serial, impact terminals designed for remote printing applications where impeccable print quality is required. The SPINWRITER terminals print up to 55 characters per second while receiving data at rates up to 120 characters per second via the RS-232C/CCITT V.24 interface. The unique print element, called a print thimble, contains up to 128 fully formed characters. If the number of characters is limited to 125, a space is left so that the last characters printed are fully visible to the operator.

**PRINT THIMBLE** - the SPINWRITER's unique small-diameter, low-mass print element is a low-cost, long-life, fiberglass reinforced plastic "thimble" that is produced by arranging cylindrically and molding 64 individual, spring action fingers on which two characters are mounted, one above the other. Normal print element life is more than 30 million impressions. Various fonts are available.

**COMMUNICATION CAPABILITY** - The SPINWRITER can be interfaced to a data communication network through a Bell 103-type modem (or equivalent). It communicates in either half or full duplex at data rates of 110, 300 or 1200 Baud. Received characters are stored in a 256 character communication line buffer while keyboard generated characters pass through a 16 character buffer.

**OPERATING NOISE LEVEL** - The SPINWRITER is quiet—only 60 dB with the standard die-cast aluminum cover installed, 67 dB (Maximum) with cover removed. The low operating noise level allows the SPINWRITER to be used in an office environment.

Date: **March, 1979**

Submitted By: **Bruce A. Thatcher, Product Manager**



**TERMINALS  
DIRECTORY**

## Impact Printing Terminals

XI.240

Company Name **OLIVETTI CORPORATION OF AMERICA**

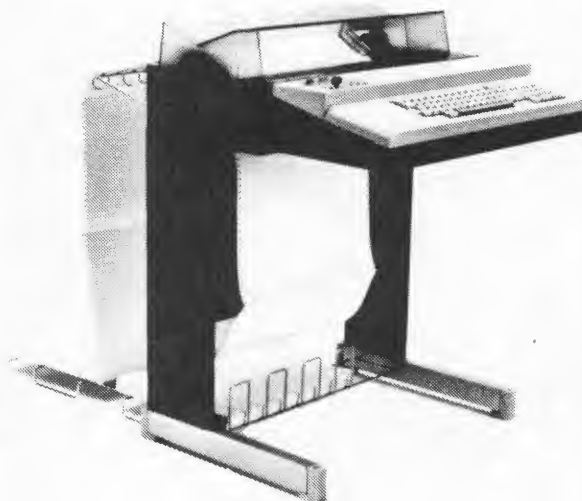
Headquarters Address **500 Park Ave., New York, NY 10022**

Headquarters Contact **George Efstathakis** Telephone Number: **(212) 371-5500**

### Key Features

Printing Technique	7 Dot Matrix
Printing Speed (Characters/Second)	10 - 30 cps
Maximum Characters Per Line	132
Lower Case Available	Yes
Forms Feed Method	Sprocket Feed
Transmission Code	USASCII
Internal Buffer	64 char.
Weight	40 kg.
Purchase Cost (With Coupler)	\$ 2,500
Monthly Cost for Service Contract	\$ 14
Monthly Cost for One Year Lease (With Service)	\$ 140
Monthly Cost for Three Year Lease (With Service)	\$ n.a.
Year Introduced	1978
Approximate Number Installed	200
Serviced By	Olivetti Corp. of America

Model: **TC 485 KSR**



### General Description

The TC 485 Keyboard Send/Receive Terminal is a highly reliable Impact type device that can be used as a simple 8-bit teleprinter, as a simple inter-active terminal, as a small batch terminal or as a console terminal. It has a flexible number of communications interfaces: EIA RS232C, neutral or polar telegraphic, and 20MA current loop interface. It uses the USASCII code set. Standard fan-fold paper is used in any size (3" to 15"), and prints 132 columns at 10 characters per inch. The ribbon cartridge is easily snapped in place for replacement.

The dot matrix print head provides a full character impact (7 x 9) for 1 original and 3 copies, yet the quietness of operation is suitable for a small office. Top speed typing is maintained by a buffer that stores data during paper and carriage movement. The print rate is actually stepped up during such phases to insure no data loss.

A wide variety of options are available including programmable tab memory, top of form, form length and form feed. Additionally paper tape, magnetic tape, and minidisk with semi-conductor memory may be specified. A Receive Only Model TC 481 is also available with similar characteristics.

Date: **March, 1979**

Submitted By: **G. Efstathakis, Marketing Manager**

*Mr. Subritz*

Company Name **PERKIN-ELMER TERMINALS DIVISION**

Headquarters Address **Rt. 10 & Emery Ave., Randolph, N.J. 07801**

Headquarters Contact **Lloyd N. Pearson, III**

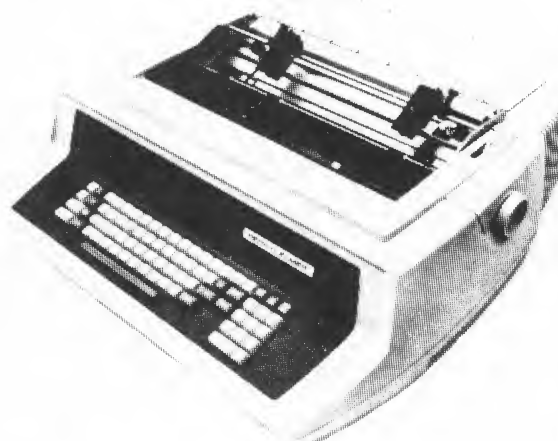
Telephone Number: **(201) 366-5550**

584-1400

## Key Features

Printing Technique	Carousel Print Cup
Printing Speed (Characters/Second)	30
Maximum Characters Per Line	132 (10 pitch) <sup>1</sup>
Lower Case Available	Standard
Forms Feed Method	Friction; Pin Feed (opt.)
Transmission Code	USASCII
Internal Buffer	128
Weight	70 lbs.
Purchase Cost (With Coupler)	\$ 3130 <sup>2</sup>
Monthly Cost for Service Contract	\$ 39
Monthly Cost for One Year Lease (With Service)	\$ n.a.
Monthly Cost for Three Year Lease (With Service)	\$ n.a.
Year Introduced	1975
Approximate Number Installed	n.a.
Serviced By	Perkin-Elmer Terminals Division

Model: **Carousel 310 Terminal Printer**



## General Description

The Carousel 310 Terminal with 30 characters per second impact printing, has EIA RS232C interface, operating at 110, 150 and 300 baud, switch selectable, transmitting full and half duplex. Features Electronic Format Control, 96 Character Set, Keyboard with Numeric Pad, Rear Feed Paper Path for multipart forms. Includes patented, non-skew friction feed paper handling system to make pin feed platen unnecessary.

Unique with the Carousel line is a power front forms insertion device that automatically feeds ledger cards, single sheet and bottom-glued multipart forms into the platen. An additional accessory enables this device to handle multipart forms which are not bottom-glued, even when the sheets making up the form are of varying lengths.

Also offered are an adjustable-width pin-feed tractor and a journal roll holder that can be interchanged in seconds. A wide variety of print cups can be selected that include the standard Courier 72, APL and OCR-A fonts. All are easily interchangeable by the operator.

Ideally suited for business and financial environments, the Carcusel 310 has already proved its forms-handling effectiveness in thousands of installations in such areas as banking, insurance and credit.

<sup>1</sup>165 (12.5 pitch) optional

<sup>2</sup>without coupler

Date: **March, 1979**

Submitted By: **Lloyd N. Pearson, III, Sr. Marketing Analyst**

*Bill Stanger, Dir. Marketing*  
*David Inghel*

Company Name : PERKIN-ELMER TERMINALS DIVISION  
 Headquarters Address : Rt. 10 & Emery Ave., Randolph, N.J. 07801  
 Headquarters Contact : Lloyd N. Pearson, III Telephone Number: (201) 366-5550

## Key Features

Printing Technique : Carousel Print-Cup  
 Printing Speed (Characters/Second) : 30  
 Maximum Characters Per Line : 132 (10 pitch)<sup>1</sup>  
 Lower Case Available : Yes  
 Forms Feed Method : Friction, Pin Feed (opt.)  
 Transmission Code : USASCII  
 Internal Buffer : 128 characters  
 Weight : 70 lbs.  
 Purchase Cost (With Coupler) : \$ 4175<sup>2</sup>  
 Monthly Cost for Service Contract : \$ 44  
 Monthly Cost for One Year Lease (With Service) : \$ n.a.  
 Monthly Cost for Three Year Lease (With Service) : \$ n.a.  
 Year Introduced : 1975  
 Approximate Number Installed : n.a.  
 Serviced By : Perkin-Elmer Terminals Division

Model: Carousel 350 Terminal Printer



## General Description

A 30 character per second impact printer with EIA RS232C interface, operating at 110, 150 and 300 baud, switch selectable, transmitting full and half duplex. Featuring 96 Character Set, Keyboard with Numeric Pad, Rear Feed Path, Firmware and Mechanical Provisions for Front Forms Insertion.

The Carousel 350 essentially offers two printers in one. Each split-platen section has its own independent drive system, forms-handling options, programmable left margin, programmable form length, and addressable vertical positioning. Typically, one platen section is used for journaling interactive messages between the operator and computer system, and report printing. The other section handles and prints the ledger card form.

The Carousel 350 can easily be re-configured by the operator in less than a minute, including changing to another platen with a different split location, further extending its versatility and economy.

Carousel print fonts are operator interchangeable and are available in a variety of styles including OCR-A, APL and Courier 72.

<sup>1</sup>165 (12.5 pitch) optional.

<sup>2</sup>without coupler.



Company Name : QUME CORPORATION

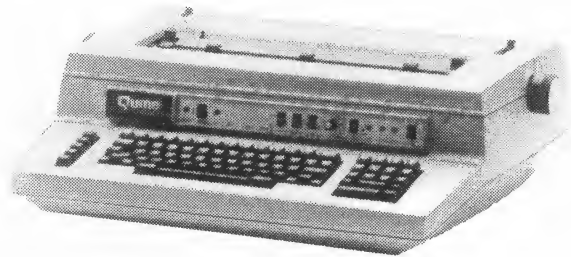
Headquarters Address : 2323 Industrial Parkway West, Hayward, CA 94545

Headquarters Contact : Lee Cannon

Telephone Number: ~~(415) 783-6100~~  
(408) 942-4000**Key Features**

Printing Technique	Daisy Wheel
Printing Speed (Characters/Second)	45 and 55
Maximum Characters Per Line	132-10 pitch, 158-12 pitch
Lower Case Available	Yes
Forms Feed Method	Yes
Transmission Code	ASCII
Internal Buffer	Yes
Weight	44 lbs.
Purchase Cost (With Coupler)	\$ 3,300
Monthly Cost for Service Contract	\$ 33
Monthly Cost for One Year Lease (With Service)	\$ n.a.
Monthly Cost for Three Year Lease (With Service)	\$ n.a.
Year Introduced	1977
Approximate Number Installed	n.a.
Serviced By	Sorbus in major cities

Model: QUME S5/45, S5/55

**General Description**

A microprocessor-controlled daisywheel printer specifically designed for integration into dataprocessing systems. Available as an KSR terminal, the S5 provides high quality, high speed daisywheel printing. Important features include:

- Over 50 different type styles including APL, Scientific Symbols and international character sets.
- Smart microprocessor utilization for powerful flexibility
- 43 Qume-defined commands for operator control
- Convenient switch selectable functions on front panel
- Serial or parallel interface

Date: March, 1979

Submitted By: Lee Cannon

Company Name : **RANDAL DATA SYSTEMS, INC.**

Headquarters Address : **2807 F5 Oregon Ct., Torrance, CA 90503**

Headquarters Contact : **Mr. John Sparks** Telephone Number: **(213) 328-7460**

## Key Features

Printing Technique : **Matrix**

Printing Speed (Characters/Second) : **30 cps**

Maximum Characters Per Line : **132**

Lower Case Available : **Yes**

Forms Feed Method : **Pin Feed**

Transmission Code : **ASCII, APL**

Internal Buffer : **32 char.**

Weight : **102 lbs.**

Purchase Cost (With Coupler) : **\$ 2310**

Monthly Cost for Service Contract : **\$ 25**

Monthly Cost for One Year Lease (With Service) : **\$ 90**

Monthly Cost for Three Year Lease (With Service) : **\$ 87**

Year Introduced : **1974**

Approximate Number Installed : **300**

Serviced By : **Randal Data Systems  
Data Force Div.**

Model: **LA 36 DECwriter II**



## General Description

The LA-36 is a low-cost, end-user Matrix, (7 x 7 dot) teleprinter. It has a 20ma current loop standard or optional EIA or CCITT interface optional.

The keyboard is 128 character, ASCII upper and lower case, alpha and numeric punctuation. It also has 97 character set, (64 printable) optional for compatibility with upper case only devices. Break key is included for half duplex software.

Data transmission is 110, 150 or 300 baud, switch selectable. It can run local, half duplex or full duplex, switch selectable. Parity is even, odd or mark, (no parity), switch selectable.

The LA-36 prints in true 30-CPS with 60-CPS catch-up. Full 132 column printing with 10 characters per inch horizontally and 6 lines per inch vertically. It will print original and five (5) copies. Uses standard pin feed tractor drive.

The LA-36 is 33.2 inches high, 27.5 inches wide, and weighs 100 pounds. It may be used in series with CRT's or the Randal floppy disk send and receive, (store and edit) for off or on line communications.

Date: **March, 1979**

Submitted By: **John Sparks, Mgr., Terminal Sales & Leasing**



Company Name	RANDAL DATA SYSTEMS, INC.		
Headquarters Address	2807 F5 Oregon Ct., Torrance, CA 90503		
Headquarters Contact	Mr. John Sparks	Telephone Number:	(213) 328-7460

## Key Features

Printing Technique	Daisy wheel
Printing Speed (Characters/Second)	45 cps
Maximum Characters Per Line	132 - 158
Lower Case Available	Yes
Forms Feed Method	Forms Tractor
Transmission Code	ASCII, APL
Internal Buffer	Yes, 128
Weight	48 lbs.
Purchase Cost (With Coupler)	\$ 3280
Monthly Cost for Service Contract	\$ 30
Monthly Cost for One Year Lease (With Service)	\$ 135
Monthly Cost for Three Year Lease (With Service)	\$ 130
Year Introduced	1975
Approximate Number Installed	175
Serviced By	Randal Data Systems Data Force Div.

Model: Texterm Terminals



## General Description

The Texterm Terminal is a multi-use terminal that offers reliability, letter quality print and graphics capability. Texterm is an ASCII, asynchronous terminal with a microprocessor that sends and receives from a remote terminal or host computer. It is compatible with other 110-300 baud modems, using RS232-C interface.

The complete flexibility of the printer mechanism is maintained in the interface design so that appropriate software can take advantage of the printer's graphics capability, it's high speed horizontal and vertical tabbing and it's backward printing capability. Unnecessary carriage movement is eliminated, thus making the effective print speed significantly higher than other terminals.

Other standard features include:

- Complete forms handling capability.
- Control Panel.
- Audible Alarm.
- Full ASCII character set.
- Escape code functions.
- 8 char send buffer.
- 158 char print buffer.
- Data error detection.

Options available are numeric key pad, Logical bit-paired keyboard and forms tractor.

Date: March, 1979

Submitted By: John Sparks, Mgr., Terminal Sales &amp; Leasing



**TERMINALS  
DIRECTORY**

## Impact Printing Terminals

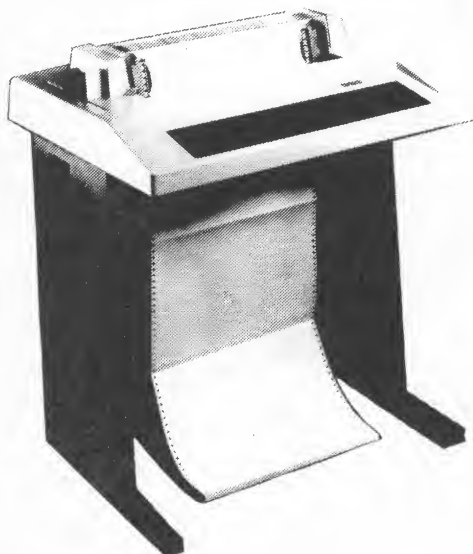
XI.302

Company Name : RANDAL LEASING, INC.  
Headquarters Address : 2909 Bldg. C-8, Oregon Ct., Torrance, CA 90503  
Headquarters Contact : Mr. John Sparks Telephone Number: (213) 328-7460

### Key Features

Printing Technique : 7 x 7 Dot Matrix  
Printing Speed (Characters/Second) : 180 cps  
Maximum Characters Per Line : 132  
Lower Case Available : Yes (Standard)  
Forms Feed Method : Tractor  
Transmission Code : ASCII  
Internal Buffer : \*  
Weight : 107 lbs.  
Purchase Cost (With Coupler) : \$ 2,995  
Monthly Cost for Service Contract : \$ 35  
Monthly Cost for One Year Lease (With Service) : \$ 185  
Monthly Cost for Three Year Lease (With Service) : \$ n.a.  
Year Introduced : 1977  
Approximate Number Installed : n.a.  
Serviced By : Data Force, Inc.  
Div. of Randal

Model: LA120 DECwriter III



### General Description

DECwriter III is designed for 1200 baud transmission; however, it can switch to 110, 300 or even 4800. All other features such as on-line, duplex are switch selectable.

DECwriter III's buffered operation minimizes carriage movement. It can look ahead to where next line begins and returns only to that point.

\*1K FIFO buffer standard. 4-16K ASR buffer optional.

Date: May, 1979

Submitted By: John Sparks, Mgr. Terminal Sales & Leasing



Company Name : **RANDAL LEASING, INC.**

Headquarters Address : **2909 Bldg. C-8, Oregon Ct., Torrance, CA 90503**

Headquarters Contact : **Mr. John Sparks** Telephone Number: **(213) 328-7460**

**Key Features**

Printing Technique : **9 x 7 Dot Matrix**

Printing Speed (Characters/Second) : **30 cps**

Maximum Characters Per Line : **132**

Lower Case Available : **Yes (Standard)**

Forms Feed Method : **Sheet or Roll \***

Transmission Code : **ASCII**

Internal Buffer : **130**

Weight : **25 lbs.**

Purchase Cost (With Coupler) : **\$ 1,450**

Monthly Cost for Service Contract : **\$ n.a.**

Monthly Cost for One Year Lease (With Service) : **\$ n.a.**

Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**

Year Introduced : **1978**

Approximate Number Installed : **n.a.**

Serviced By : **Digital Field Service and number of Independent companies**

Model: **LA34 DECwriter IV****General Description**

The LA 34 DECwriter IV is a 300 baud, 30 cps desk-top terminal that can print at burst speeds up to 45 characters per second. An alternate rate of 110 baud is keyboard selectable. The terminal can operate full duplex, or full duplex with local echo.

The terminal features clear, crisp character registration from its 9 x 7 dot matrix impact print head. Character width ranges from 10 to 16.5 characters per inch. Vertical spacing is variable from 6 lines per inch to 12 lines per inch.

The terminals roll platen accepts single sheet or roll feed paper. Tractor are available as an option. Tabs and margins are also standard.

\*Tractors optional

Date: **May, 1979**Submitted By: **John Sparks, Mgr. Terminal Sales & Leasing**

Company Name : **TALLY CORPORATION**

Headquarters Address : **Kent, Washington, DC 98031**

Headquarters Contact : **W. D. dei Valie**

Telephone Number: **(206) 251-5536**

## Key Features

Printing Technique : **Wire Matrix (7 x 7)**

Printing Speed (Characters/Second) : **160 Optimized Bi-directional**

Maximum Characters Per Line : **132/158/220**

Lower Case Available : **Standard**

Forms Feed Method : **Dual Sets of Tractors**

Transmission Code : **USASCII**

Internal Buffer : **1K Standard**

Weight : **68.5**

Purchase Cost (With Coupler) : **\$ 3,750**

Monthly Cost for Service Contract : **\$ 33.00**

Monthly Cost for One Year Lease (With Service) : **\$ \***

Monthly Cost for Three Year Lease (With Service) : **\$ \***

Year Introduced : **1977**

Approximate Number Installed : **Over 1,000**

Serviced By : **Tally Corporation, Tally Dealers**

Model: **TALLY T-1612 TELEPRINTER**



## General Description

The TALLY T-1612 is a high performance, "top of the line" 1200 baud terminal. With its 160 cps bi-directional printing and standard 1K buffer, it is able to keep up with 120 cps networks with no pad characters required. The quietest 1200 baud terminal (55 dBA) it provides, as a standard feature, 42 programmable functions. These functions, entered from either the keyboard or host computer, allow six different type sizes, from 5 to 16.5 characters per inch. Vertical and horizontal formatting and tabbing, 6 and 8 lines per inch spacing, programmable answerback, protocols for HDX and FDX, and test modes are all controlled via the programmable function.

Interfaces for 103, 113, 212A, 202, and VADIC 3400 are all included in the standard unit, as well as, a serial I/O for mini-computers operating up to 9600 baud with XON/XOFF control.

An RO version is available with a 16 key pad for entering programmable functions.

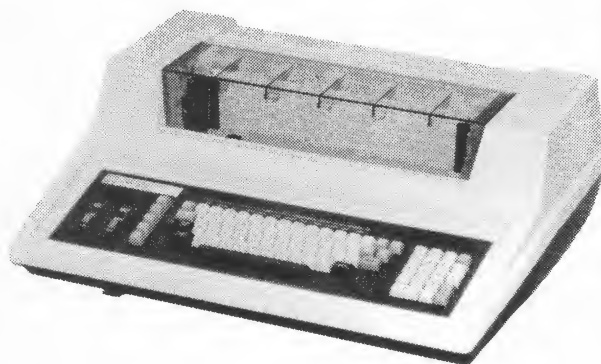
\*Available through Dealers.

Company Name	TEXAS INSTRUMENTS INCORPORATED		
Headquarters Address	P.O. Box 1444, Houston, TX 77001		
Headquarters Contact	Joseph A. Fields	Telephone Number:	(713) 937-2066

## Key Features

Printing Technique	:	9 x 7 Dot Matrix
Printing Speed (Characters/Second)	:	150 cps bi-directional
Maximum Characters Per Line	:	132
Lower Case Available	:	Yes
Forms Feed Method	:	Tractor Feed
Transmission Code	:	ASCII
Internal Buffer	:	640 char.
Weight	:	18.2 Kg (40 lbs.)
Purchase Cost (With Coupler)	:	\$ 2,695
Monthly Cost for Service Contract	:	\$ 25
Monthly Cost for One Year Lease (With Service)	:	\$ 115
Monthly Cost for Three Year Lease (With Service)	:	\$ 105
Year Introduced	:	1978
Approximate Number Installed	:	n.a.
Serviced By	:	Texas Instruments

Model: OMNI 800\* MODEL 820 KSR



## General Description

The Model 820 KSR is the newest addition to TI's OMNI 800 Family of impact printers and printing terminals. The wide-carriage Model 820 receives and transmits data at speeds up to 9600 baud. The bi-directional 9 x 7 dot matrix printhead prints an original and up to five easy-to-read copies at a true 150 characters per second. The Terminal Status Block serves as a column counter and error code indicator in operation mode, and as an operating parameter code indicator when in the configuration mode.

The table-top Model 820 is completely configurable from the keyboard, totally self-contained, and has rear and bottom paper feed. Options include APL character set, 18-key numeric key pad, acoustic coupler, Device Forms Control, Compressed Print (16.5 characters per inch), and current loop interface. With all this and more, the exceptionally quiet and reliable Model 820 is setting new standards in impact printing terminals.

\*Trademark of Texas Instruments

Date: March, 1979

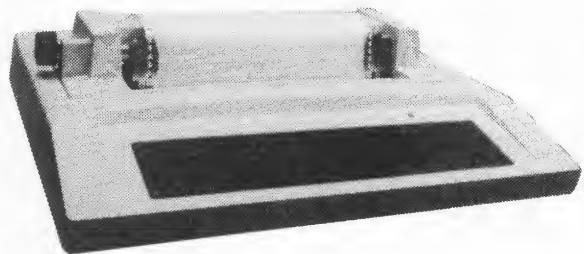
Submitted By: Joseph A. Fields, Product Manager

Company Name	TRENDATA CORPORATION		
Headquarters Address	610 Palomar Ave., Sunnyvale, CA 94086		
Headquarters Contact	Paul F. O'Neill, Dir. of Marketing	Telephone Number:	(408) 732-1790

## Key Features

Printing Technique	7 x 7 Dot Matrix
Printing Speed (Characters/Second)	30 cps
Maximum Characters Per Line	132
Lower Case Available	Yes
Forms Feed Method	Pin Feed
Transmission Code	ASCII
Internal Buffer	No
Weight	102 lbs.
Purchase Cost (With Coupler)	\$ 2,420
Monthly Cost for Service Contract	\$ 25
Monthly Cost for One Year Lease (With Service)	\$ 97
Monthly Cost for Three Year Lease (With Service)	\$ 85
Year Introduced	1976
Approximate Number Installed	Over 3000
Serviced By	Trendata Corp.

Model: TRENDATA 300



## General Description

The Trendata® TRENDwriter is a compact, economical data communications terminal for on-line or local operation. This 30-cps (300-baud) machine is distinguished by quiet operation and a wide range of optional features. Its electronic keyboard is of familiar typewriter style, with a full complement of ASCII upper and lower case characters. A highly reliable 7 x 7 matrix printer uses the latest printing technology with a minimum of moving parts. The basic TRENDwriter comes complete with keyboard, printer, and attractive pedestal, ASCII communications, TTY interface, half- and full-duplex operation, and speed select of 10, 15, and 30 cps. Optionally available is full forms control including horizontal and vertical tabulation, top of form, and paper-out sensing.

**PRODUCT HIGHLIGHTS** - True 30 cps effective printing throughput; Full 128-character upper and lower case ASCII electronic keyboard; Standard ANSI typewriter-style keyboard layout minimizes need for special training of operators; Full line length of 132 characters (10 characters/inch) facilitates use of standard line-printer forms; Positive tractor feed advances paper precisely without slipping or misalignment of multipart forms, which can be up to 20 thousandths of an inch thick; Movable right tractor lets you use forms as narrow as 3 inches (76.2 mm) and as wide as 14 7/8 inches (377.8 mm); Vernier vertical adjustment permits exact registration of print head and form; Unique print head design gives excellent readability, with true upper- and lower-case characters; New ribbon mechanism eliminates smudging; Ribbon is easy to change; Quiet operation keeps office noise levels down; Integral 20 mA loop is standard TTY interface; RS-232C is optional; Plug-to-plug compatibility simplifies system use with ASR33 or 35 Teletype.

Date: March, 1979

Submitted By: Paul F. O'Neill, Director of Marketing





Company Name TRENDATA CORPORATION

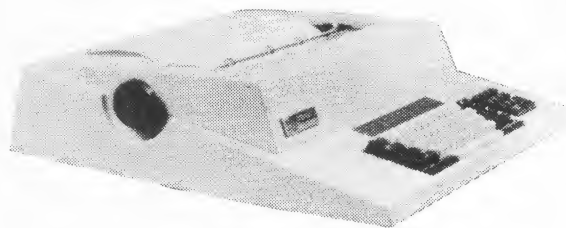
Headquarters Address 610 Palomar Ave., Sunnyvale, CA 94086

Headquarters Contact Paul F. O'Neil, Dir. of Marketing Telephone Number: (408) 732-1790

**Key Features**

Printing Technique	Daisy Wheel
Printing Speed (Characters/Second)	30
Maximum Characters Per Line	132 (158-12 pitch)
Lower Case Available	Yes
Forms Feed Method	Friction
Transmission Code	ASCII-CORR.-EBCD
Internal Buffer	Yes - 1K char.
Weight	216 lbs.
Purchase Cost (With Coupler)	\$ 4,720
Monthly Cost for Service Contract	\$ 30
Monthly Cost for One Year Lease (With Service)	\$ 155
Monthly Cost for Three Year Lease (With Service)	\$ 135
Year Introduced	1976
Approximate Number Installed	Over 3000
Serviced By	Trendata Corp.

Model: TRENDATA 4000A

**General Description**

Trendata's Model 4000A and 4741 terminals are designed to meet all of the data communication needs of a modern business, and to serve as high-quality printers as well. Model 4000A is a full-duplex terminal with ANSI keyboard legend standard.

Your operators will like the terminal work station, because it was designed to help them work efficiently. Control keys are grouped conveniently close at hand, yet they don't interfere with typing. The standard typewriter keyboard (with tactile feedback, "N"-key rollover, and two-key lockout), number pad, and operator-programmable keys were designed for fast, error-free data entry. Almost anyone who has used a normal office typewriter or another type of terminal can operate the Trendata terminal after only a few hours of instruction. The attractive workstation will complement any office and the terminal's quiet operation won't disturb other workers.

Microprocessor-based architecture and an electronic keyboard with few mechanical parts make the Trendata terminal inherently reliable. If a problem does occur, a built-in diagnostic routine isolates the malfunction. When repairs are needed, they can be made quickly by replacing plug-in electronic modules on a swing-out panel, so down-time is kept to a minimum.

The daisy-wheel printer gives superb print quality for the original and up to five copies. Interchangeable type fonts and selectable 10- or 12-pitch printing add to the versatility of the machine. Line length is 132 columns (10 pitch) or 158 columns (12 pitch). Print speed up to 30 cps, and transmission rates are selectable up to 300 baud. Options include forms tractors, additional printer controls, unattended operation feature, various keyboard legends, additional workstation features, and many more.

Date: March, 1979

Submitted By: Paul F. O'Neil, Director of Marketing



Company Name TRENDATA CORPORATION

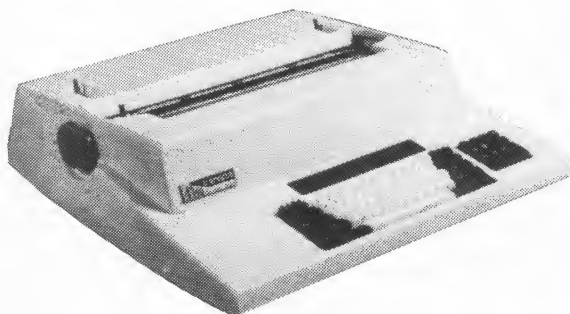
Headquarters Address 610 Palomar Ave., Sunnyvale, CA 94086

Headquarters Contact Paul F. O'Neil, Dir. of Marketing Telephone Number: (408) 732-1790

**Key Features**

Model: TRENDATA 4740

Printing Technique	Daisy Wheel
Printing Speed (Characters/Second)	45 cps
Maximum Characters Per Line	132 (158-12 pitch)
Lower Case Available	Yes
Forms Feed Method	Friction
Transmission Code	EBCD
Internal Buffer	Yes 120-1536 char.
Weight	216 lbs.
Purchase Cost (With Coupler)	\$ 4,995
Monthly Cost for Service Contract	\$ 32
Monthly Cost for One Year Lease (With Service)	\$ n.a.
Monthly Cost for Three Year Lease (With Service)	\$ n.a.
Year Introduced	1977
Approximate Number Installed	Over 500
Serviced By	Trendata Corp.

**General Description**

The Model 4740 Data Communication Terminal is a fully-buffered (Transmit & Receive), multipoint, hardcopy terminal that is plug-to-plug compatible with the IBM 2740 Mod II in terms of line protocol and communication codes. The standard 4740 is also equipped with a host of upward enhancements permitting the terminal to be utilized in a wide variety of general purpose or special applications.

Your operators will like the terminal work station, because it was designed to help them work efficiently. Control keys are grouped conveniently close at hand, yet they don't interfere with typing. The keyboard, "N"-key rollover, and two-key lockout, number pad, and operator-programmable keys were designed for fast, error-free data entry. Almost anyone who has used a normal office typewriter or another type of terminal can operate the Trendata terminal after only a few hours of instruction. The attractive work station will complement any office, and the terminal's quiet operation won't disturb other workers.

Microprocessor-based architecture and an electronic keyboard with few mechanical parts make the Trendata terminal inherently reliable. If a problem does occur, a built-in diagnostic routine isolates the malfunction. When repairs are needed, they can be made quickly by replacing plug-in electronic modules on a swing-out panel, so down-time is kept to a minimum. The daisy-wheel printer gives superb print quality for the original and up to five copies. Interchangeable type fonts and selectable 10- or 12-pitch printing add to the versatility of the machine. Line length is 132 columns (10 pitch) or 158 columns (12 pitch). Print speed up to 45 cps, and transmission rates are selectable up to 1800 baud.

Options include forms tractors, additional printer controls, and many more.

Date: March, 1979

Submitted By: Paul F. O'Neil, Director of Marketing



Company Name Western Union Data Services

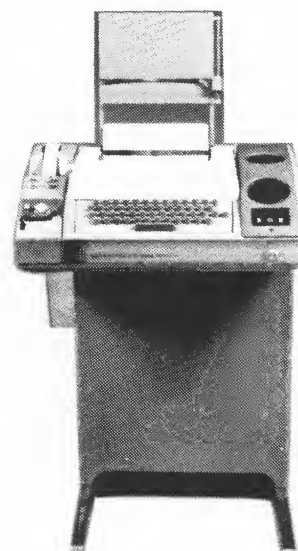
Headquarters Address 70 McKee Drive, Mahwah, New Jersey 07430

Headquarters Contact Sales Support Telephone Number: (800) 631-7050\*

**Key Features**

Printing Technique	Cylindrical type wheel
Printing Speed (Characters/Second)	10 cps
Maximum Characters Per Line	72 or 86
Lower Case Available	No
Forms Feed Method	Friction or Pin Feed
Transmission Code	USASCII
Internal Buffer	No
Weight	KSR 54 lbs, ASR 56 lbs.
Purchase Cost (With Coupler)	\$ 1345 KSR <sup>1</sup>
Monthly Cost for Service Contract	\$ 26 KSR <sup>2</sup>
Monthly Cost for One Year Lease (With Service)	\$ 64 KSR <sup>3</sup>
Monthly Cost for Three Year Lease (With Service)	\$ 4
Year Introduced	1970
Approximate Number Installed	over 5,000
Serviced By	Western Union Data Services

Model: EDT 33

**General Description**

The Exchange Data Terminal 33 is a versatile communications terminal designed for transmitting and receiving data over the telephone exchange network. A standard 20 character answerback can be coded to customer specifications, and single or double line spacing is available. The printer is offered in two versions; friction feed or pin feed. The pin feed version can accommodate printed forms and comes standard with form feed.

The ASR model of the EDT 33 offers paper tape punching and reading capabilities. This allows for the preparation of data off-line. The data may then be transmitted to a computer at the maximum transmission rate of the terminal.

\*in N.J. call: (201) 529-1170

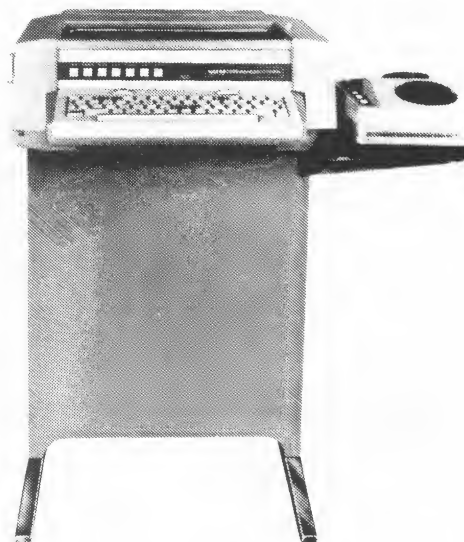
<sup>1</sup>\$1670 ASR<sup>2</sup>\$28 ASR<sup>3</sup>\$75 ASR<sup>4</sup>Price determined by customer requirements

Company Name	Western Union Data Services		
Headquarters Address	70 McKee Drive, Mahwah, New Jersey 07430		
Headquarters Contact	Sales Support	Telephone Number:	(800) 631-7050*

## Key Features

Model: EDT 300

Printing Technique	Belt w/preformed font
Printing Speed (Characters/Second)	10, 15, 30 cps
Maximum Characters Per Line	75 or 118
Lower Case Available	Yes
Forms Feed Method	Friction, Pin or Tractor feed
Transmission Code	USASCII
Internal Buffer	No
Weight	125 lbs.
Purchase Cost (With Coupler)	\$ 3130 <sup>1</sup>
Monthly Cost for Service Contract	\$ 34
Monthly Cost for One Year Lease (With Service)	\$ 115 <sup>2</sup>
Monthly Cost for Three Year Lease (With Service)	\$ 3
Year Introduced	1973
Approximate Number Installed	over 7,000
Serviced By	Western Union Data Services



## General Description

The EDT 300 Terminal is offered in a variety of configurations such as:

- 300 KSR
- 300 ASR
- 300 MSR/KSR
- 300 MSR/ASR (MSR-Magnetic Tape Buffer with over 50,000 characters of storage)

The Exchange Data Terminal 300 KSR is a versatile communication terminal. It is a compact, self-contained unit designed for transmitting and receiving data over the telephone exchange network at various speeds (110, 150, and 300 Baud), in serial form, and prints on conventional paper by impact means. It is primarily electronic in design and contains a minimum number of moving parts, resulting in extremely quiet operation. It is completely modularized in construction, mechanically and electrically.

\*In N.J., telephone: (201) 529-1170

<sup>1</sup>Coupler additional \$275

<sup>2</sup>Coupler additional \$15

<sup>3</sup>Price determined by customer requirements

Date: March, 1979

Submitted By: J.A. Steele, Manager - Sales Support



Company Name : Western Union Data Services

Headquarters Address : 70 McKee Drive, Mahwah, New Jersey 07430

Headquarters Contact : Sales Support Telephone Number: (800) 631-7050\*

**Key Features**

Printing Technique : Belt w/preformed font

Printing Speed (Characters/Second) : 10, 20, 30, 120 cps

Maximum Characters Per Line : 132

Lower Case Available : Yes

Forms Feed Method : Tractor Feed

Transmission Code : USASCII

Internal Buffer : Yes, 1,024 char.

Weight : 116 lbs.

Purchase Cost (With Coupler) : \$ 4775<sup>1</sup>

Monthly Cost for Service Contract : \$ 50

Monthly Cost for One Year Lease (With Service) : \$ 175<sup>2</sup>

Monthly Cost for Three Year Lease (With Service) : \$ 150<sup>3</sup>

Year Introduced : 1977

Approximate Number Installed : over 100

Serviced By : Western Union Data Services

Model: EDT 1232

**General Description**

The EDT 1232 is offered in a variety of configurations, such as:

- 1232 KSR
- 1232 MSR/KSR (MSR-Magnetic Tape buffer with over 50,000 characters of storage)
- V100/1232 RO (Using a CRT for the keyboard and a 1232 Receive Only for hard copy)

The Exchange Data Terminal 1232 is a quiet, high speed, serial asynchronous data communications device designed to operate at speeds of 10, 20, 30, and 120 characters per second (cps). It is RS232C compatible and uses the USASCII code set. An integrated numeric key pad and control key cluster is incorporated into the keyboard. The printer has 132 print positions and is capable of printing 95 ASCII graphic characters with extremely high print quality. This is even so on multipart forms; an original and five copies is normal. An adjustable tractor feed mechanism is provided which will accommodate edge-punched fan-fold paper or forms from 3 to 14-7/8 inches in width. Vertical tab, horizontal tab and form feed are standard. The paper can be loaded from either the front or rear of the 1232.

There is a 1,024 character buffer in the EDT 1232 which provides an effective throughput of 120 cps. In addition, the EDT 1232 may be ordered with a magnetic tape cassette buffer. With this option data can be prepared and stored off-line and be polled later by a remote computer.

\*In N.J. call: (201) 529-1170

<sup>2</sup>coupler additional \$15<sup>1</sup>coupler additional \$275<sup>3</sup>coupler additional \$14

Date: March, 1979

Submitted By: J.A. Steele, Manager - Sales Support

Company Name : XEROX CORPORATION, DATA SYSTEMS DIVISION  
 Headquarters Address : 701 So. Aviation Blvd., El Segundo, CA 90245  
 Headquarters Contact : Mark Shriro Telephone Number: (213) 679-4511

## Key Features

Printing Technique : Diablo Daisywheel  
 Printing Speed (Characters/Second) : 45 cps  
 Maximum Characters Per Line : 132/158 - variable  
 Lower Case Available : Yes  
 Forms Feed Method : Friction<sup>1</sup>  
 Transmission Code : ASCII  
 Internal Buffer : Yes, 158 characters  
 Weight : 48 lbs.  
 Purchase Cost (With Coupler) : \$ 3555<sup>2</sup>  
 Monthly Cost for Service Contract : \$ 35 Inc. coupler  
 Monthly Cost for One Year Lease (With Service) : \$ 128  
 Monthly Cost for Three Year Lease (With Service) : \$ 177<sup>3</sup>  
 Year Introduced : 1976  
 Approximate Number Installed : over 3000  
 Serviced By : Xerox in 20+ metro areas;  
 Sorbus in 50+ other cities

Model: Xerox 1700 Communications Terminal



## General Description

The Xerox 1700 is a desktop, microprocessor-driven terminal utilizing the Diablo Hytype II printer mechanism. It affords the user typewriter-quality printed output at speeds of up to 45 cps. Cut sheet or continuous form paper may be used; form width may be up to 15 inches — 132 columns at 10-pitch or 158 columns at 12-pitch. Horizontal and vertical spacing may be varied under program control, as may a host of other forms control features. Graphics mode allows plotting as well.

The 1700 communicates asynchronously using ASCII code, and is supplied with the EIA RS 232C Interface; switch selectable transmission rates are standard at 110, 150 and 300 baud; with 1200 baud full duplex an option.

A Receive-Only version, the Xerox 1710, is also available.

<sup>1</sup>Tractor or Pin feed optional

<sup>2</sup>Quantity discounts available, GSA pricing available

<sup>3</sup>Greater equity accrual rate than under 1-year lease

Date: March, 1979

Submitted By: Mark Shriro, Product Manager

*X-225*





Company Name XEROX CORPORATION, DATA SYSTEMS DIVISION

Headquarters Address 701 Aviation Blvd., El Segundo, CA 90245

Headquarters Contact Mark Shriro Telephone Number: (213) 679-4511

**Key Features**

Printing Technique : Diablo Daisy Wheel

Printing Speed (Characters/Second) : 45 cps

Maximum Characters Per Line : 132/158 - Variable

Lower Case Available : Yes

Forms Feed Method : Friction<sup>1</sup>

Transmission Code : ASCII/2741-EBCD CORR

Internal Buffer : Yes, 256 char.

Weight : 48

Purchase Cost (With Coupler) : \$ 3,765<sup>2</sup>

Monthly Cost for Service Contract : \$ 40<sup>3</sup>

Monthly Cost for One Year Lease (With Service) : \$ 138

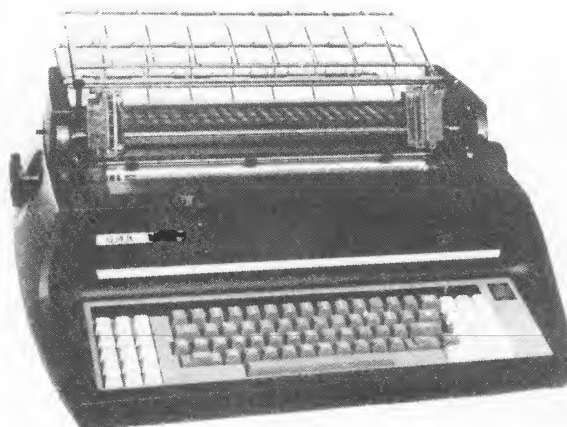
Monthly Cost for Three Year Lease (With Service) : \$ 125

Year Introduced : 1977

Approximate Number Installed : n.a.

Serviced By : Xerox Corp.

Model: Xerox 1720 Communications Terminal

**General Description**

The Xerox 1720 offers three terminals in one, ASCII compatibility, 2741 compatibility and optional APL. The 1720 features the Diablo HyType II mechanism with typewriter print quality and interchangeable type fonts.

Full graphics capability with 1/120" horizontal and 1/48" vertical spacing.

Standard interface is EIA RS232C with switch selectable half or full duplex at 110 (134.5), 300, 600, 1200.

<sup>1</sup>Adjustable Forms Tractor Optional - Pinfeed Platen Optional.

<sup>2</sup>Quantity discounts available.

<sup>3</sup>Coupler included.



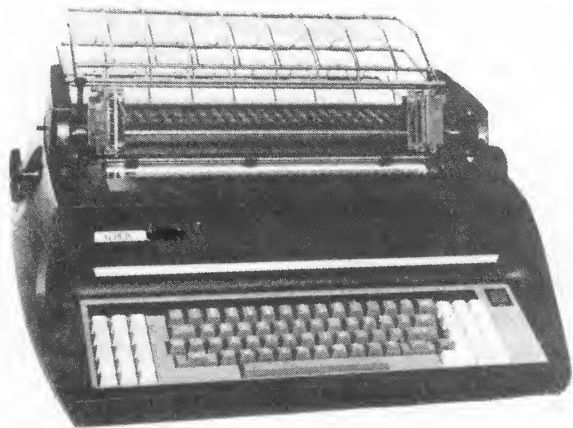
Company Name **XEROX CORPORATION, DATA SYSTEMS DIVISION**

Headquarters Address **701 S. Aviation Blvd., El Segundo, CA 90245**

Headquarters Contact **Mark Shriro** Telephone Number: **(213) 679-4511**

**Key Features**

Printing Technique	Metal Clad Daisy Wheel
Printing Speed (Characters/Second)	45 cps
Maximum Characters Per Line	132/158 - Variable
Lower Case Available	Yes
Forms Feed Method	Friction
Transmission Code	ASCII/2741 - Opt.
Internal Buffer	Yes - 256
Weight	48
Purchase Cost (With Coupler)	\$ n.a.
Monthly Cost for Service Contract	\$ n.a.
Monthly Cost for One Year Lease (With Service)	\$ n.a.
Monthly Cost for Three Year Lease (With Service)	\$ n.a.
Year Introduced	1979
Approximate Number Installed	n.a.
Serviced By	Xerox Corp.

Model: **Xerox 1750 Communications Terminal****General Description**

The Xerox 1750 Communications Terminal offers word processing quality in an ASCII terminal along with graphics.

Forms handling will be through optional bi-directional adjustable tractor as well as an automatic cut sheet feeder.

Optional word processing enhancements will allow for automatic proportional spacing, automatic shadow printing, automatic column alignment and other WP features.

Standard EIA RS232-C interface and switch selectable half or full duplex at 110, 300, 600, 1200 baud.

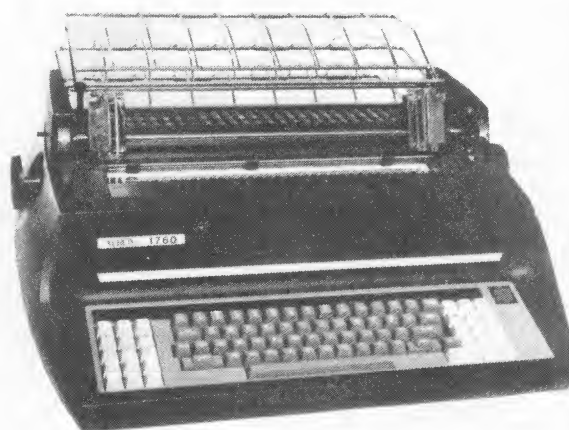
Date: **March, 1979**Submitted By: **Mark Shriro, Product Manager**

Company Name	XEROX CORPORATION, DATA SYSTEMS DIVISION		
Headquarters Address	701 South Aviation Boulevard, El Segundo, CA 90245		
Headquarters Contact	Mark Shiro	Telephone Number:	(213) 679-4511

## Key Features

Printing Technique	7x9 Wire Dot Matrix
Printing Speed (Characters/Second)	Up to 200 cps
Maximum Characters Per Line	132
Lower Case Available	Yes, standard
Forms Feed Method	Friction; tractor
Transmission Code	ASCII
Internal Buffer	Yes, 1280 char.
Weight	48
Purchase Cost (With Coupler)	\$ 2990 <sup>1</sup>
Monthly Cost for Service Contract	\$ 50
Monthly Cost for One Year Lease (With Service)	\$ 150
Monthly Cost for Three Year Lease (With Service)	\$ 140
Year Introduced	1978
Approximate Number Installed	n.a.
Serviced By	Xerox-Data Systems Div.

Model: Xerox 1760 Communications Terminal



## General Description

The Xerox 1760 is a microprocessor - driven computer terminal using the Diablo 2300 matrix printer mechanism. The 1760 offers typewriter - style keyboard, automatic bi-directional printing, high speed horizontal and vertical tabbing and versatile forms handling features.

The 1760 communicates asynchronously, at switch-selectable transmission speeds of 300, 1200, 1800 or 4800 baud; on EIA RS 232C interface and parity checking/generation are standard.

The Xerox 1760 is suited to a wide range of interactive timesharing applications, or may be used as the printer with a CRT or mini/micro computer.

<sup>1</sup>No coupler included; quantity discounts are available.

Date: March, 1979

Submitted By: Mark Shiro, Product Manager



**THERMAL PRINTING TERMINALS**

**American Terminal Leasing\***

TEXAS INSTRUMENTS 745 ..... XII.020

**Computer Devices Incorporated**

MINITERM 1203 ..... XII.040

MINITERM 1204 & 1205 ..... XII.041

1132 WIDE CARRIAGE PORTABLE .. XII.042

**Computer Transceiver Systems, Inc.**

EXECUPORT 4000 ..... XII.050

**Texas Instruments Incorporated**

733 ASR ..... XII.060

745 PORTABLE DATA TERMINAL ... XII.061

765 PORTABLE MEMORY TERM. .... XII.062

\*Companies shown in **bold print** are Corporate Associate Members of ATSU.



**TERMINALS  
DIRECTORY**

## Thermal Printing Terminals

XII.020

Company Name : **AMERICAN TERMINAL LEASING**

Headquarters Address : **P.O. Box 68, Kenmore Station, Boston, MA 02215**

Headquarters Contact : **Dick Noonan** Telephone Number: **(617) 261-1100**

### Key Features

Printing Technique : **5 x 7 Dot Matrix**

Printing Speed (Characters/Second) : **10 - 30 cps**

Maximum Characters Per Line : **80**

Lower Case Available : **Optional**

Forms Feed Method : **Friction**

Transmission Code : **ASCII**

Internal Buffer : **Yes**

Weight : **13 lbs.**

Purchase Cost (With Coupler) : **\$ 1,795**

Monthly Cost for Service Contract : **\$ 17.50**

Monthly Cost for One Year Lease (With Service) : **\$ 97.50**

Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**

Year Introduced : **1976**

Approximate Number Installed : **n.a.**

Serviced By : **Texas Instruments**

Model: **TEXAS INSTRUMENTS 745**



### General Description

At just 13 lbs., the Texas Instruments 745 is the perfect companion to the traveling business person who needs the right information on the spot...when it counts. This handsome terminal is designed with MOS/LSI integrated circuits, a solid-state printhead, and a minimum of moving parts, for a long life of trouble-free reliable operation.

A built-in Solid State acoustic coupler enables communications via the telephone network to the base computer. Other standard features include a standard ASCII keyboard with calculator-type embedded numeric keypad, switch selectable half or full duplex, and 5 x 7 dot matrix with print contrast control.

American Terminal Leasing offers the Texas Instruments 745 for immediate delivery on a 90-day minimum lease. The terminal may then be leased on a month-to-month basis. Lower monthly rates are available on one year leases. Nationwide maintenance and installation plans will be tailored to your requirements.

Date: **March, 1979**

Submitted By: **Dick Noonan, Marketing Manager**



Company Name : COMPUTER DEVICES INCORPORATED  
Headquarters Address : 25 North Avenue, Burlington, MA 01803  
Headquarters Contact : Donald R. Cadieux Telephone Number: (617) 273-1550

**Key Features**

Printing Technique : Thermal  
Printing Speed (Characters/Second) : Selectable 10/15/30  
Maximum Characters Per Line : 80  
Lower Case Available : Yes, standard  
Forms Feed Method : Friction  
Transmission Code : TTY, ASCII, Numeric  
Internal Buffer : n.a.  
Weight : 18 lbs.  
Purchase Cost (With Coupler) : \$ 2185  
Monthly Cost for Service Contract : \$ 16  
Monthly Cost for One Year Lease (With Service) : \$ 100  
Monthly Cost for Three Year Lease (With Service) : \$ 85  
Year Introduced : 1976  
Approximate Number Installed : n.a.  
Serviced By : Computer Devices, Inc. Olivetti

Model: MINITERM 1203

**General Description**

The CDI Miniterm 1203 is a compact portable printer terminal designed for a wide variety of data preparation applications. Utilizing a versatile Alphanumeric Keyboard equipped with N Key rollover and is switch selectable into any of the following modes — Teletype (TTY); Typewriter (upper/lower case) and Numeric.

The Miniterm 1203 has a built-in modem and acoustic coupler which are compatible with all major time-sharing systems over telephone lines. A standard RS-232 connector is provided for interface with any compatible equipment including CRT displays; X-Y plotters or tape cassette devices. A permanent hard copy record of data transmitted and data received from the computer is provided by the thermal character printer.





Company Name : **COMPUTER DEVICES INCORPORATED**

Headquarters Address : **25 North Avenue, Burlington, MA 01803**

Headquarters Contact : **Donald R. Cadieux** Telephone Number: **(617) 273-1550**

**Key Features**

Printing Technique : **Thermal**

Printing Speed (Characters/Second) : **35**

Maximum Characters Per Line : **80**

Lower Case Available : **Yes**

Forms Feed Method : **Friction**

Transmission Code : **ASCII; ALT (TTY/APL)**

Internal Buffer : **Yes, 128 characters**

Weight : **1204/20 lbs.; 1205/25 lbs**

Purchase Cost (With Coupler) : **\$ 3,385\***

Monthly Cost for Service Contract : **\$ 28**

Monthly Cost for One Year Lease (With Service) : **\$ 165\***

Monthly Cost for Three Year Lease (With Service) : **\$ 135\***

Year Introduced : **1977**

Approximate Number Installed : **n.a.**

Serviced By : **Computer Devices Inc. Olivetti**

Model: **MINITERM 1204 & 1205****General Description**

The Miniterm Models 1204 and 1205 are compact, lightweight ASR computer terminals designed for a wide variety of remote data preparation, editing and communications applications. Both models utilize a built-in mini-cassette and versatile 8K random access memory providing a simultaneous transmit and receive capability with all major computers and central processors. Incorporated in both terminals is an extremely versatile Alphanumeric Keyboard, it is equipped with N Key rollover and is switch selectable into any of the following modes - Typewriter (upper/lower case); Alternate (TTY or APL); or Numeric. Both terminals utilize manual switches allowing the user to select local, full or half duplex modes of operation and to select Off/Odd/Even parity.

The portable 1205 model provides a built-in modem and acoustic coupler which are compatible with all major timesharing systems over ordinary telephone lines. A standard RS-232 connector is provided on both the 1204 and 1205 for hard wire applications.

\*Cost for 1205 - \$3,785, \$185, \$155 respectively.

Company Name **COMPUTER DEVICES INCORPORATED**Headquarters Address **25 North Avenue, Burlington, MA 01803**Headquarters Contact **Donald R. Cadieux**Telephone Number: **(617) 273-1550****Key Features**

Printing Technique	Thermal
Printing Speed (Characters/Second)	Selectable 10/15/30
Maximum Characters Per Line	132
Lower Case Available	Yes, standard
Forms Feed Method	Friction
Transmission Code	ASCII or APL
Internal Buffer	n.a.
Weight	25 lbs.
Purchase Cost (With Coupler)	\$ 3285
Monthly Cost for Service Contract	\$ 26
Monthly Cost for One Year Lease (With Service)	\$ 145
Monthly Cost for Three Year Lease (With Service)	\$ 115
Year Introduced	1974
Approximate Number Installed	n.a.
Serviced By	Computer Devices Inc. Olivetti

Model: **1132 WIDE CARRIAGE PORTABLE****General Description**

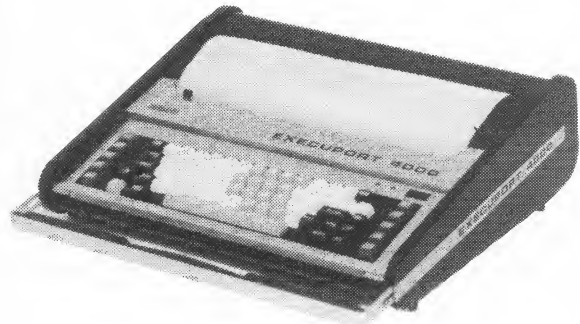
The CDI 1132 is a wide carriage portable printer terminal designed for a wide variety of data preparation applications. Communication with a remote computer can be established by placing the phone handset in the acoustic coupler, located on the rear of the terminal and dialing the computer telephone number. A permanent hard copy record of data transmitted and data received from the computer is provided by the thermal character printer. A standard RS-232 connector is provided for interface with any compatible equipment including CRT displays, X-Y Plotters, or tape cassette devices. The 1132 comes equipped with manual switches which allow the user to select full, half or local duplex mode or parity: odd, even or none.

**Company Name :** COMPUTER TRANSCIVER SYSTEMS, INC.  
**Headquarters Address :** E 66 Midland Ave., P.O. Box 15, Paramus, NJ 07652  
**Headquarters Contact :** Robert J. Gallagher **Telephone Number:** (201) 261-6800

## Key Features

**Printing Technique :** Thermal  
**Printing Speed (Characters/Second) :** 10/30 (4741-14.8/33.3)  
**Maximum Characters Per Line :** 136  
**Lower Case Available :** Yes, Standard  
**Forms Feed Method :** Friction  
**Transmission Code :** ASCII (4741-PTTC/EBCD)  
**Internal Buffer :** Buffered Carriage Return  
**Weight :** 16 lbs.  
**Purchase Cost (With Coupler) :** \$3,495\*  
**Monthly Cost for Service Contract :** \$ 26  
**Monthly Cost for One Year Lease (With Service) :** \$ 158\*  
**Monthly Cost for Three Year Lease (With Service) :** \$ 122\*  
**Year Introduced :** 1978  
**Approximate Number Installed :** n.a.  
**Serviced By :** Dow-Jones Company (Nationwide)

**Model:** EXECUPORT 4000



## General Description

The Execuport 4000 is a wide carriage portable printing data terminal which weighs only 16 lbs. It has a built-in acoustic coupler and modem. It is microprocessor controlled for greater reliability and flexibility. It employs a quiet thermal printer of proven design which gives true 30 cps printing speed. The printer will accept paper for either 80 or 136 column printout.

The Execuport 4000 is available with ASCII or ASCII/APL keyboards arranged in teletype or typewriter formats. The terminals print true upper and lower case characters.

The Execuport 4000 features: Horizontal tabbing; a built-in self test routine; printhead position indicator; plotting bi-directional 1/4 line stepping; an embedded numeric pad; and a parity error display.

The Execuport 4741 emulates the IBM 2741 protocol and transmits in PTTC/EBCD code. It is available with EBCD or EBCD/APL keyboard styles.

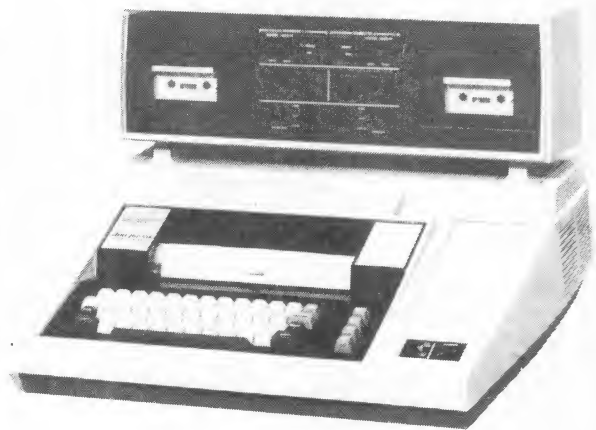
\*Quantity Discounts Available.

**Date:** May, 1979

**Submitted By:** E. L. Moore, V.P. - Business Development

Company Name : **TEXAS INSTRUMENTS INCORPORATED**Headquarters Address : **P. O. Box 1444, Houston, Texas 77001**Headquarters Contact : **Data Terminal Marketing**Telephone Number: **(713) 937-2000****Key Features**Model: **733 ASR**

Printing Technique : **5 x 7 Dot Matrix**  
Printing Speed (Characters/Second) : **Switch selectable 10, 15, 30**  
Maximum Characters Per Line : **80**  
Lower Case Available : **Yes, standard**  
Forms Feed Method : **Friction Feed**  
Transmission Code : **8-Level ASCII**  
Internal Buffer : **No**  
Weight : **25 kg. (55 lbs.)**  
Purchase Cost (With Coupler) : **\$ 3440**  
Monthly Cost for Service Contract : **\$ 33.00**  
Monthly Cost for One Year Lease (With Service) : **\$ 165**  
Monthly Cost for Three Year Lease (With Service) : **\$ 150**  
Year Introduced : **1973**  
Approximate Number Installed : **n.a.**  
Serviced By : **Texas Instruments**

**General Description**

The Model 733 ASR offers simultaneous transmit and receive capability, selectable record or playback on each cassette, and simultaneous on-line transmission and off-line data preparation. Additional standard features include high speed tape duplication and a complete, off-line block and character data editing facility. ANSI - compatible cassettes are used with 86 character block recording, providing about 288,000 characters storage per cassette. A full range of options is available, including a full ASCII Keyboard, 1200 baud transmission, acoustic coupler, answer-back memory, remote device control, a Binary Data Format for storage of object programs, and others. The Model 733 is also available in a KSR version, and both versions are available with Baudot/CCITT code (Model 732) and a choice of line interfaces.

Company Name	:	TEXAS INSTRUMENTS INCORPORATED	
Headquarters Address	:	P. O. Box 1444, Houston, Texas 77001	
Headquarters Contact	:	Data Terminal Marketing	Telephone Number: (713) 937-2000

## Key Features

Printing Technique	:	5 x 7 Dot Matrix
Printing Speed (Characters/Second)	:	Switch selectable 10 or 30
Maximum Characters Per Line	:	80
Lower Case Available	:	Yes
Forms Feed Method	:	Friction Feed
Transmission Code	:	8-level ASCII
Internal Buffer	:	Yes, standard
Weight	:	6 kg. (13 lbs.)
Purchase Cost (With Coupler)	:	\$ 1995
Monthly Cost for Service Contract	:	\$ 16.00
Monthly Cost for One Year Lease (With Service)	:	\$ 100
Monthly Cost for Three Year Lease (With Service)	:	\$ 90
Year Introduced	:	1976
Approximate Number Installed	:	n.a.
Serviced By	:	Texas Instruments

Model: 745 Portable Data Terminal



## General Description

The Model 745 Portable Data Terminal is a member of TI's "Silent 700" data terminal family. The 745 is microprocessor controlled for superior reliability and performance. The field-proven thermal printing technique delivers virtually silent, true 30 cps printing for a fast, hard copy. Weighing only 6 kg. (13 lbs.), the briefcase-sized 745 provides true portability, fitting easily under an airline seat. The Model 745 has a built-in acoustic coupler and optional auxiliary EIA Interface capability.

The Model 743 KSR is the companion model to the 745. The 743 is a compact keyboard send-receive terminal ideal for stationary computer input/output. The Model 743 KSR interfaces via TTY, EIA, or optional integral modem.

Both the 745 and the 743 terminals are available with optional dual APL/Full ASCII keyboard.



**TERMINALS  
DIRECTORY**

## Thermal Printing Terminals

XII.062

Company Name : TEXAS INSTRUMENTS INCORPORATED

Headquarters Address : P. O. Box 1444, Houston, Texas 77001

Headquarters Contact : Data Terminal Marketing

Telephone Number: (713) 937-2016

### Key Features

Printing Technique : 5 x 7 Dot matrix  
Printing Speed (Characters/Second) : Up to 30 cps  
Maximum Characters Per Line : 80  
Lower Case Available : Standard  
Forms Feed Method : Friction Feed  
Transmission Code : USASCII  
Internal Buffer : Standard  
Weight : 7.7 kg (17 lbs.)  
Purchase Cost (With Coupler) : \$ 2995  
Monthly Cost for Service Contract : \$ 22  
Monthly Cost for One Year Lease (With Service) : \$ 140  
Monthly Cost for Three Year Lease (With Service) : \$ 125  
Year Introduced : 1977  
Approximate Number Installed : n/a  
Served By : Texas Instruments

Model: 765 Portable Memory Terminal



### General Description

The first known commercial application of magnetic bubble memories in the computer industry, the Model 765 Portable Memory Terminal is a fully capable 30 cps terminal with a full ASCII keyboard, built-in numeric cluster, built-in acoustic coupler, and carrying case. Powerful editing capability, a file management system, and a powerful operator command mode provide excellent user flexibility. The standard 765 also includes traditional ASR functions such as playback and record control with USASCII commands.

The TI bubble memory used in the 765 is a non-volatile data storage medium that retains data even when the power is off. Compared to electro-mechanical storage devices, bubble memories have the advantages of electronic reliability, higher access speeds, smaller size, less weight, and reduced power consumption.

The Model 763 is a companion model of the 765. Offering the same features and capabilities as the 765, the Model 763 console communicates via EIA or current loop and is available with an optional internal originate only modem.

Date: September, 1979

Submitted By: Ed Bartos, Product Manager



## VIDEO DISPLAY TERMINALS

American Telephone & Telegraph Co.	
DATASPEED® 40 .....	XIII.020
VuSet .....	XIII.021
Anderson Jacobson, Inc.	
AJ 510 .....	XIII.040
Applied Digital Data Systems	
REGENT 100 .....	XIII.060
REGENT 200 .....	XIII.061
Digital Equipment Corporation	
VT100 .....	XIII.080
Hazeltine Corporation	
1400/1410 SERIES .....	XIII.100
1500/1510/1520 SERIES .....	XIII.101
MODULAR ONE EDIT/POLLING ....	XIII.102
Hewlett-Packard Company	
2621A, 2621P .....	XIII.120
2640B .....	XIII.121
2645A .....	XIII.122
2648A .....	XIII.123
Infoton, Incorporated	
200/3 .....	XIII.140
400/4 .....	XIII.141
I-100 .....	XIII.142
Perkin-Elmer Data Systems	
MODEL 1100 .....	XIII.160
OWL 1200 .....	XIII.161
Racal-Milgo Information Systems, Inc.	
SYSTEM 400 MODEL 1 .....	XIII.180
SYSTEM 400 MODEL 2 .....	XIII.181
SYSTEM 400 MODEL 3 .....	XIII.182
40+ MPL .....	XIII.183
Ramtek Corporation	
6110 COLORGRAPHICS .....	XIII.200
6200A COLORGRAPHICS .....	XIII.201
6310 COLORGRAPHICS .....	XIII.202
Tektronix, Incorporated	
4024 .....	XIII.220
4025 .....	XIII.221
4027 .....	XIII.222
Vardon & Associates, Inc.	
ADM-3A .....	XIII.240
Volker-Craig, Ltd.	
VC404 THE STANDARD .....	XIII.260
VC414 THE EDITOR .....	XIII.261
<b>Western Union Data Services</b>	
VIDEO 100 .....	XIII.280
VIDEO 200 .....	XIII.281
Wordstream Corporation	
G77 .....	XIII.300

Companies shown in **bold print** are Corporate Associate Members of AT&S

Company Name : **ANDERSON JACOBSON, INC.**

Headquarters Address : **521 Charcot Avenue, San Jose, CA 95131**

Headquarters Contact : **Steve Tritto** Telephone Number: **(408) 263-8520**

**Key Features**

Model: **AJ 510**

Screen Size (Diagonal) : **15 inch**

Maximum Characters Per Line : **80**

Maximum Lines on Screen : **24**

Lower Case Available : **Yes**

Transmission Speed (char. sec.) : **up to 9600 bps**

Transmission Code : **ASCII**

Internal Buffer : **1920**

Weight : **22.5 Kg (50 lbs)**

Purchase Cost (Without Coupler) : **\$ 1,995**

Monthly Cost for Service Contract : **\$ 20**

Monthly Cost for One Year Lease (With Service) : **\$ 85**

Monthly Cost for Three Year Lease (With Service) : **\$ 77**

Year Introduced : **1979**

Approximate Number Installed : **n.a.**

Serviced By : **AJ**


**General Description**

The AJ 510 is designed for operator convenience, ease of operation and high data throughput. It comes equipped with a typewriter-styled keyboard with an alphanumeric section, cursor control pad, numeric pad and terminal control keys. Two character sets are standard with the AJ 510 — the full 128 character ASCII set and a 40 character graphics set. The terminal can also be equipped with an optional APL character set and keyboard.

The AJ 510 provides 16 different video enhancements; cursor addressing and sensing; protected and unprotected fields for forms applications; full editing capabilities and self test diagnostics.

For rapid throughput, data can be transferred asynchronously from the AJ 510 via its RS 232C ports directly to a serial printer and/or through a full duplex or half duplex modem.

Company Name : **APPLIED DIGITAL DATA SYSTEMS**

Headquarters Address : **100 Marcus Boulevard, Hauppauge, NY 11787**

Headquarters Contact : **Joseph Friedman** Telephone Number: **231-5400**

## Key Features

Screen Size (Diagonal) : **12 inch**

Maximum Characters Per Line : **80**

Maximum Lines on Screen : **24**

Lower Case Available : **Yes, standard**

Transmission Speed (char./sec.) : **Up to 9600 baud**

Transmission Code : **ASCII**

Internal Buffer : **Yes, 1 page**

Weight : **47 lbs.**

Purchase Cost (Without Coupler) : **\$ 1325**

Monthly Cost for Service Contract : **\$ n.a.**

Monthly Cost for One Year Lease (With Service) : **\$ n.a.**

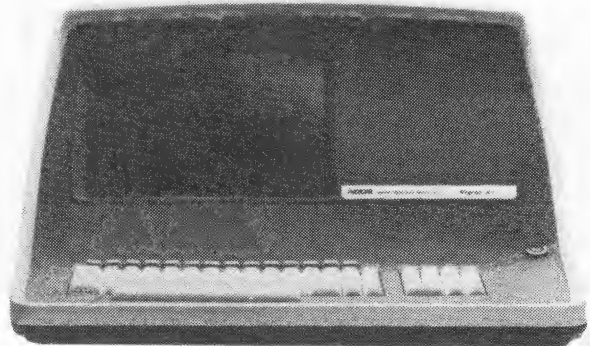
Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**

Year Introduced : **1977**

Approximate Number Installed : **7500**

Serviced By : **TRW & ADDS**

Model: **REGENT 100**



## General Description

The Regent 100 terminal is a teletypewriter compatible video display terminal. The Regent 100 displays a total of 1,920 highly legible characters arranged in 24 lines with 80 characters per line. A 25th line, a "status" line distinct from the rest of the display, shows at a glance the operating mode of the terminal. Communication with the data processing system or minicomputer takes place a character at a time, on a conversational basis, via a standard EIA RS232C interface or a 20 milliampere current loop interface. Eleven transmission rates, up to 9,600 baud, are available and all are switch selectable.

A full set of visual attributed reverse video, underline, half and zero intensity and blinking are all standard features of the Regent 100. Combining full cursor addressability, 96 ASCII character set, and line drawing, the Regent 100 is an exceptional and flexible conversational terminal.

A significant feature of this terminal is the Regent 100's "status" line. This line, distinct from the data entry area, reveals the operational condition of the terminal at a glance. In addition to "status" messages (Local, Carrier, Auxiliary On), the results of the Regent 100's self diagnostic test of memory and the communications interface appear on this line.

The Regent 100 has an option package which provides eight function keys, five keys to facilitate movement of the cursor, and an auxiliary bidirectional serial interface used to connect peripheral devices to the Regent.

Date: **May, 1979**

Submitted By: **Joseph Friedman, Technical Support Manager**



Company Name : APPLIED DIGITAL DATA SYSTEMS

Headquarters Address : 100 Marcus Boulevard, Hauppauge, NY 11787

Headquarters Contact : Joseph Friedman Telephone Number: 231-5400

**Key Features**

Screen Size (Diagonal) : 12 inch

Maximum Characters Per Line : 80

Maximum Lines on Screen : 24

Lower Case Available : Yes, standard

Transmission Speed (char./sec.) : Up to 9600 baud

Transmission Code : ASCII

Internal Buffer : Yes, 1 page

Weight : 47 lbs.

Purchase Cost (Without Coupler) : \$ 1795

Monthly Cost for Service Contract : \$ n.a.

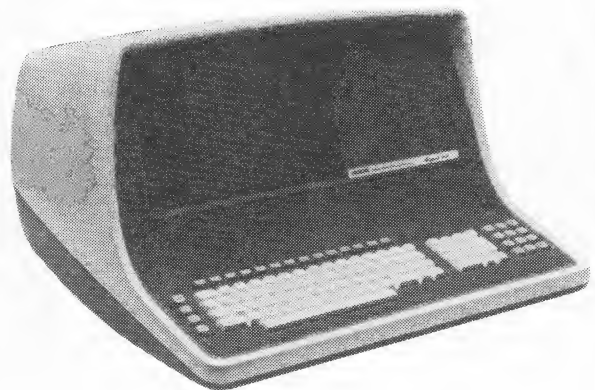
Monthly Cost for One Year Lease (With Service) : \$ n.a.

Monthly Cost for Three Year Lease (With Service) : \$ n.a.

Year Introduced : 1977

Approximate Number Installed : 2300

Serviced By : TRW & ADDS

Model: **REGENT 200****General Description**

The Regent 200 terminal is a teletypewriter compatible video display terminal. Displaying a total of 1,920 highly legible characters arranged in 24 lines with 80 characters per line, the Regent 200 also has a status line distinct from the rest of the display. This line displays the operating mode of the terminal and the results of its self diagnostic tests of memory and communications interface. Communication with the data processing system or minicomputer takes place a character at a time, on a conversational basis, via a standard EIA RS232C interface or a 20 milliampere current loop interface. Eleven transmission rates up to 9,600 baud are available, and all are switch selectable. Because it is completely buffered, the Regent 200 significantly reduces CPU functions and software requirements. The choice of either PAGE or MESSAGE operating mode allows local display and editing before communication to the computer. In PAGE mode, the operator can transmit a small unit of data, using the partial transmit feature, while with the MESSAGE mode, line at a time transmission is possible. A third mode, CONVERSATIONAL transmits a character at a time. The FORMS GENERATION mode of the Regent 200 allows the operator to generate a formatted screen with protected and variable fields, and to transmit it to a computer or an auxiliary device. Other fields can be embedded in the screen format to control a printer or transmit unique codes in the data stream. Protected or variable data in the display can be highlighted by reverse video, half and full intensity, blinking and underlining. Standard features include eight pre-programmed function keys, a fourteen key numeric pad and auxiliary bidirectional serial interface.

An editing option package is available on the Regent 200. This package allows the operator to insert or delete either characters or lines of data by simple keystrokes.

Date: May, 1979

Submitted By: Joseph Friedman, Technical Support Manager



Company Name : HAZELTINE CORPORATION

Headquarters Address : Greenlawn, NY 11740

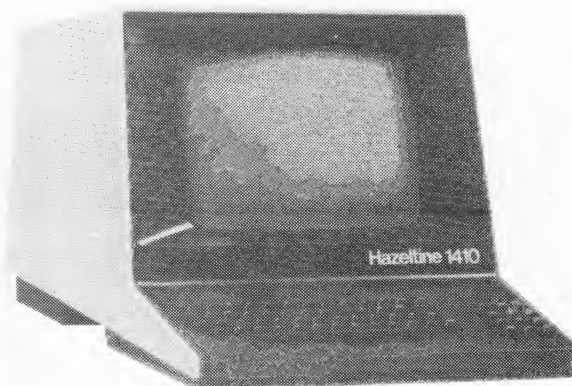
Headquarters Contact : R. Rose, National Sales Manager

Telephone Number: (516) 549-8800

**Key Features**

Screen Size (Diagonal) : 12 inch  
Maximum Characters Per Line : 80  
Maximum Lines on Screen : 24  
Lower Case Available : No  
Transmission Speed (char. sec.) : 110-9600 (8 selectable)  
Transmission Code : ASCII/RS232/EIA  
Internal Buffer : Yes, 1920 characters  
Weight : 28 lbs. (12.7 Kg)  
Purchase Cost (Without Coupler) : \$ \*  
Monthly Cost for Service Contract : \$ 8  
Monthly Cost for One Year Lease (With Service) : \$ n.a.  
Monthly Cost for Three Year Lease (With Service) : \$ n.a.  
Year Introduced : 1978  
Approximate Number Installed : Over 5000 of series  
Serviced By : Hazeltine Corp.

Model: HAZELTINE 1400/1410 SERIES



**General Description**

**HAZELTINE 1400** - An advanced microprocessor design terminal with all electronic circuit board yielding the utmost in reliability-backing this up, Hazeltine gives as standard, a two (2) year return-to-factory warranty.

Other features are cursor addressing & sensing and 11 remote commands.

**HAZELTINE 1410** - All above plus an integral numeric pad.

\*850-Qty. 1 EU (1400)



Company Name : **HAZELTINE CORPORATION**  
Headquarters Address : **Greenlawn, NY 11740**  
Headquarters Contact : **R. Rose, National Sales Manager**

Telephone Number: **(516) 549-8800****Key Features**

Screen Size (Diagonal) : **12 inch**  
Maximum Characters Per Line : **80**  
Maximum Lines on Screen : **24**  
Lower Case Available : **Yes (STD)**  
Transmission Speed (char./sec.) : **110-19.2K (9 selectables)**  
Transmission Code : **ASCII/EIA/RS2326**  
Internal Buffer : **Yes, 1920 characters**  
Weight : **35 lbs. (15.9 Kg)**  
Purchase Cost (Without Coupler) : **\$ \***  
Monthly Cost for Service Contract : **\$ 20**  
Monthly Cost for One Year Lease (With Service) : **\$ n.a.**  
Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**  
Year Introduced : **1977**  
Approximate Number Installed : **Over 20,000 of series**  
Serviced By : **Hazeltine/TRW**

Model: **HAZELTINE 1500/1510/1520 SERIES****General Description**

**HAZELTINE 1500** - A fully featured conversational terminal with high resolution monitor using a 7 x 10 character matrix, 94 displayable characters, ANSI standard keyboard with separate numeric pad, dual intensity, EIA and current loop, auxiliary EIA output, standard or reverse video and 20 remote commands - all standard.

**HAZELTINE 1510** - An editing terminal with all above plus cursor control keys, protect/ unprotected data, transmit page, batch, line of unprotected only or all, function keys (127 effective), tab and back tab, format mode with I/L and D/L key and 31 remote commands including "Terminal Status".

**HAZELTINE 1520** - All features of the 1510 plus a unique separate microprocessor controlled printer interface which allows serial or parallel operation, printer speed independent of baud rate, 2k word separate buffer, transparency, received data to either display or printer or both, and 4 additional remote commands.

\*\$1225 Qty 1 EU (1500)





Company Name : **HAZELTINE CORPORATION**  
Headquarters Address : **Greenlawn, NY 11740**  
Headquarters Contact : **R. Rose, National Sales Manager**

Telephone Number: **(516) 549-8800**

**Key Features**

Screen Size (Diagonal) : **12 inch**  
Maximum Characters Per Line : **80**  
Maximum Lines on Screen : **24**  
Lower Case Available : **Yes**  
Transmission Speed (char./sec.) : **410-9600 (8 selectable)**  
Transmission Code : **ASCII**  
Internal Buffer : **Yes**  
Weight : **50 lbs. (22.7 Kg)**  
Purchase Cost (Without Coupler) : **\$ \***  
Monthly Cost for Service Contract : **\$ 25**  
Monthly Cost for One Year Lease (With Service) : **\$ n.a.**  
Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**  
Year Introduced : **1975**  
Approximate Number Installed : **Over 10,000**  
Serviced By : **Hazeltine/TRW**

Model: **MODULAR ONE EDIT/POLLING**



**General Description**

A microprocessor based terminal that can be configured for multiple application with simple firmware change. The Modular One features a Hi resolution monitor, sharp characters in a 7 x 9 dot matrix, a stepped keyboard with non-glare keycaps, extensive editing capabilities including I/C, D/C, I/L and D/L keys. Also standard are tab, back/tab, auto tab, 8 function keys.

Full set of attributes: Protected, unprotected, Numeric, Alpha only, Dual intensity, Reverse video, Blink, non-display.

Interface: RS232 and current loop standard

Optional Synchronous Polling with a number of line disciplines available

Optional Auxiliary RS232 output and/or parallel printer interface

International option available including compliance with VDE requirement

\*2050 Qty 1 EU

Date: **May, 1979**

Submitted By: **S. Naar, Product Manager**



Company Name : **HEWLETT-PACKARD COMPANY, Data Terminals Division**

Headquarters Address : **19400 Homestead Road, Cupertino, CA 95014**

Headquarters Contact : **Ed Hayes** Telephone Number: **(408) 257-7000**

**Key Features**

Screen Size (Diagonal) : **12 inch**

Maximum Characters Per Line : **80**

Maximum Lines on Screen : **1**

Lower Case Available : **Standard**

Transmission Speed (char./sec.) : **110-9600 Baud**

Transmission Code : **ASCII**

Internal Buffer : **128 Byte Data Comm Buffer**

Weight : **2**

Purchase Cost (Without Coupler) : \$ **3**

Monthly Cost for Service Contract : \$ **4**

Monthly Cost for One Year Lease (With Service) : \$ **5**

Monthly Cost for Three Year Lease (With Service) : \$ **n.a.**

Year Introduced : **1978**

Approximate Number Installed : **n.a.**

Serviced By : **Hewlett-Packard**

Model: **2621A, 2621P****General Description**

The 2621A and 2621P terminals emphasize simplicity, reliability and quality in products designed for interactive applications. The 2621P with an integral thermal printer, combines the convenience of local hard copy with the speed of a video terminal. Both models provide for improved user productivity and increased operator satisfaction with a feature set which includes:

**HIGH RESOLUTION DISPLAY**

- Enhanced 9 x 15 Dot Character Cell
- 128 ASCII Character Set
- Character-by-character Underline
- Cursor Column Indicator

**HARD COPY (2621P)**

- 120 CPS Integral Thermal Printer
- Upper/Lower Case Letters, Control Codes, Underline
- Automatic Data Logging

**DISPLAY MEMORY**

- Two Full Pages (48 lines)
- Roll, Home-up, Home-down

**EDITING**

- Character Mode Editing (Line Mode, Modify Mode)
- Character and Line, Insert and Delete
- Cursor Addressing and Sensing
- Tabs and Margins

<sup>1</sup> Maximum Lines on Screen: 24 Lines of Text; 1 Line of Screen Labels, Messages, Etc.

<sup>2</sup> Weight: 2621A - 35 lbs.; 2621P - 40 lbs.

<sup>3</sup> Purchase Cost (Without Coupler): 2621A - \$1,450; 2621P - \$2,550

<sup>4</sup> Monthly Cost for Service Contract: 2621A - \$15; 2621P - \$25

<sup>5</sup> Monthly Cost for One Year Lease: Contact Local Sales Office

Company Name : **HEWLETT-PACKARD COMPANY, Data Terminals Division**

Headquarters Address : **19400 Homestead Road, Cupertino, CA 95014**

Headquarters Contact : **Ed Hayes** Telephone Number: **(408) 257-7000**

**Key Features**

Screen Size (Diagonal) : **11 inch**

Maximum Characters Per Line : **80**

Maximum Lines on Screen : **24**

Lower Case Available : **Yes**

Transmission Speed (char./sec.) : **240 cps**

Transmission Code : **ASCII**

Internal Buffer : **Yes**

Weight : **37 lbs**

Purchase Cost (Without Coupler) : **\$ 2600**

Monthly Cost for Service Contract : **\$ 18**

Monthly Cost for One Year Lease (With Service) : **\$ 155**

Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**

Year Introduced : **1976**

Approximate Number Installed : **n.a.**

Serviced By : **Hewlett-Packard**

Model: **Hewlett-Packard 2640B**

**General Description**

**Easy to read display:** the large 5 inch by 10 inch display of the 2640B presents up to 1,920 characters in a 24 line by 80 column format. A 9 x 15 dot character cell allows large characters to be represented accurately. Wide character and line separation, inverse video, and optional plug-in character sets with underlining, half-bright, and blinking are enhancements designed to increase clarity and ease sessions at the terminal.

**Full editing capability:** the 2640B transmits character-by-character as an interactive terminal or is capable of operating on variable length blocks of information. Local editing allows the user to modify data before transmission to the computer. Editing and computer connect times can be significantly reduced by such standard features as:

- Enhanced High-Resolution Display
- Plug-In Character Sets
- Dynamically Allocated Memory
- Pop-In Modularity and Expandability
- Microprocessor Controlled
- Character/Block Mode
- Self-Test
- Full Editing Capability
- Multi-Task Keyboard
- Off-screen Storage with Scrolling Capability
- Programmable Protected Fields
- Inverse Video for Highlighting: and Optional Blinking, Underline, Half-Bright
- Cursor Addressability and Positioning Control: tabulation
- MOS Circuitry, ROM/RAM
- Hard-Copy Interface
- Single Bus Architecture
- RS232C or Current Loop Capability

Date: **May, 1979**

Submitted By: **Jeffrey F. Cox, Product Manager**

Company Name : HEWLETT-PACKARD COMPANY, Data Terminals Division  
 Headquarters Address : 19400 Homestead Road, Cupertino, CA 95014  
 Headquarters Contact : Ed Hayes Telephone Number: (408) 257-7000

## Key Features

Screen Size (Diagonal) : 11 inch  
 Maximum Characters Per Line : 80  
 Maximum Lines on Screen : 24  
 Lower Case Available : Yes  
 Transmission Speed (char./sec.) : 960 cps  
 Transmission Code : ASCII  
 Internal Buffer : Yes  
 Weight : 43 lbs  
 Purchase Cost (Without Coupler) : \$ 3500  
 Monthly Cost for Service Contract : \$ 20  
 Monthly Cost for One Year Lease (With Service) : \$ 204  
 Monthly Cost for Three Year Lease (With Service) : \$ n.a.  
 Year Introduced : 1976  
 Approximate Number Installed : n.a.  
 Serviced By : Hewlett-Packard

Model: Hewlett-Packard 2645A



## General Description

**All 2640B features:** The high performance 2645A Display Station offers a superset of the capabilities of the 2640B. It has the same features and benefits as the 2640B and has the many significant additional features described below.

- **High Resolution Display:** Inverse Video, Half-Bright, Underline, Blinking, Plug-in Character Sets.
- **Forms Mode and Full Editing Capability:** Character/Block Mode, Field Checking, and Auto Data Logging.
- **Choice of Communications Capability:** RS232C or 20mA DC Current Loop, Point-to-Point, Asynchronous, and Asynchronous or Synchronous Polling Option with Daisy-Chain Sharing of Communications Resources.
- **Modular Architecture, Microprocessor Controlled**
- **Hard Copy Interface**
- **High Reliability, Serviceability:** Self-Test
- **User-Defined Soft Keys**
- **Fully Integrated Mass Storage (Optional):** Dual Mini-Cartridges, and Up to 110 Kilobytes of Storage each.

Company Name : **HEWLETT-PACKARD COMPANY, Data Terminals Division**

Headquarters Address : **19400 Homestead Road, Cupertino, CA 95014**

Headquarters Contact : **Ed Hayes** Telephone Number: **(408) 257-7000**

## Key Features

Screen Size (Diagonal) : **11 inch**

Maximum Characters Per Line : **80**

Maximum Lines on Screen : **24**

Lower Case Available : **Yes**

Transmission Speed (char./sec.) : **960 cps**

Transmission Code : **ASCII**

Internal Buffer : **Yes**

Weight : **43 lbs**

Purchase Cost (Without Coupler) : **\$ 5500**

Monthly Cost for Service Contract : **\$ 22**

Monthly Cost for One Year Lease (With Service) : **\$ 311**

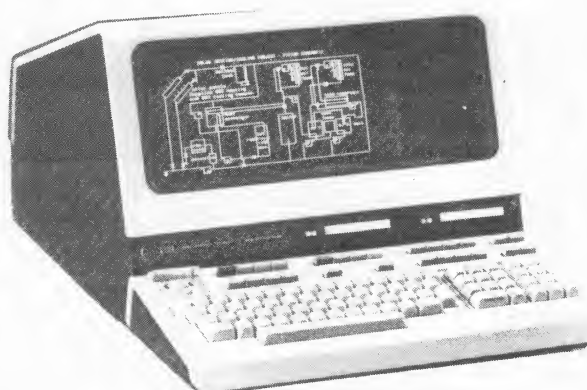
Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**

Year Introduced : **1977**

Approximate Number Installed : **n.a.**

Serviced By : **Hewlett-Packard**

Model: **Hewlett-Packard 2648A**



## General Description

The 2648A Graphics Terminal combines the latest in microprocessor and raster scan technology to provide a bright, easy-to-read display. The 2648A is a flexible and feature oriented graphics terminal that is friendly and easy-to-use. It offers users the opportunity to explore and try out new ideas in graphics.

The 2648A is the first graphics terminal in the growing 2640 family of terminals. It offers high performance graphic capabilities to users requiring low cost graphic terminals. Also, the 2648A offers all the alphanumeric capabilities of the 2645 terminal, making it a versatile tool for interactive graphics, data entry, and program development.

Company Name : **INFOTON, INCORPORATED**

Headquarters Address : **2nd Avenue, Burlington, MA 01803**

Headquarters Contact : **Inside Sales**

Telephone Number: **(617) 272-6660**

## Key Features

Screen Size (Diagonal) : **12 inch**

Maximum Characters Per Line : **80**

Maximum Lines on Screen : **24**

Lower Case Available : **Yes, standard**

Transmission Speed (char./sec.) : **50 to 19,200 BPS**

Transmission Code : **ASCII**

Internal Buffer : **No**

Weight : **42 lbs.**

Purchase Cost (Without Coupler) : \$ **2\***

Monthly Cost for Service Contract : \$ **n.a.**

Monthly Cost for One Year Lease (With Service) : \$ **n.a.**

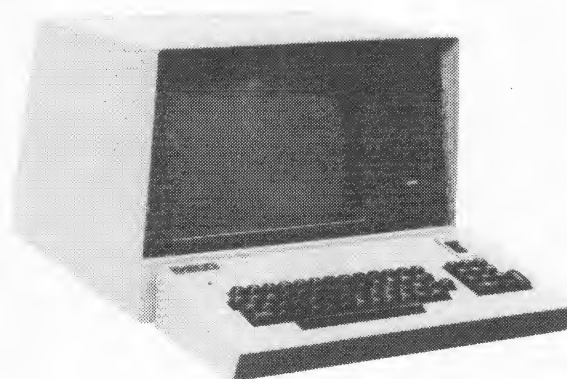
Monthly Cost for Three Year Lease (With Service) : \$ **n.a.**

Year Introduced : **1977**

Approximate Number Installed : **Over 2000**

Serviced By : **Factory**

Model: **200/3<sup>1\*</sup>**



## General Description

The new Infoton Model 200 is a Teletype compatible display terminal with roll or page mode of operation utilizing the ASCII code set. Features include 80 x 24 character display, 9 x 9 dot matrix, character mode transmission, RS-232C and 20/60 milliampere current loop interface, 16 switch selectable data rates (up to 19,200 B.P.S.) and external.

The unit employs a detached keyboard of solid state construction that guarantees ten times the performance of most mechanical keyboards, and comes in five different configurations to suit the users' unique requirements.

Available options include upper/lower case, Buffered F.I.F.O., printer interface, answerback, cursor control cluster, function keys, numeric pad, non-scroll page mode and foreign character sets.

The standard Model 200/1 offers a price that is among the lowest in the the industry, at \$795.00, in quantities 100.

<sup>1\*</sup>(Optional Model. U/L Case, Numeric pad.)

<sup>2\*</sup>\$850 in quantities of 100 or greater.



Company Name : **INFOTON INCORPORATED**

Headquarters Address : **2nd Avenue, Burlington, MA 01803**

Headquarters Contact : **Inside Sales**

Telephone Number: **(617) 272-6660**

## Key Features

Model: **400/4**

Screen Size (Diagonal) : **12 inch**

Maximum Characters Per Line : **80**

Maximum Lines on Screen : **25**

Lower Case Available : **Yes, standard**

Transmission Speed (char./sec.) : **50-19,200 BPS**

Transmission Code : **ASCII**

Internal Buffer : **Yes, 3**

Weight : **45 lbs.**

Purchase Cost (Without Coupler) : \$ **1\***

Monthly Cost for Service Contract : \$ **n.a.**

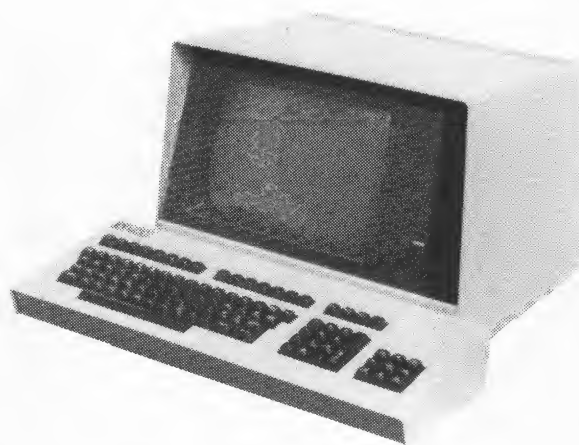
Monthly Cost for One Year Lease (With Service) : \$ **n.a.**

Monthly Cost for Three Year Lease (With Service) : \$ **n.a.**

Year Introduced : **1977**

Approximate Number Installed : **Over 2000**

Serviced By : **Factory**



## General Description

The new Infoton Model 400 is a multi-functional Terminal utilizing the ASCII code set. The advanced functionality is a result of the powerful Z-80 microprocessor and unique firmware design. Capabilities include complete formatting and editing with six variations of block mode transmission, 7 video attributes as well as character mode for normal log-in procedures or straight character operation. Features include 80 x 25 character display, 9x9 dot matrix, RS-232C and 20/60 milliampere current loop interface, 16 switch selectable data rates (up to 19,200 B.P.S.) and external.

The unit employs a detached keyboard of solid state construction that guarantees ten times the performance of most mechanical keyboards, and comes in two different configurations to suit the users' unique requirements.

Available options include buffered printer interface, polling, international version keyboards, additional pages of display memory and line drawing. The communication interface is based upon the use of control function sequences for controlling modes of video representation allowing the software designer the ultimate in terminal control and flexibility. The standard Model 400/4 offers a price that is among the lowest in the industry, at \$1,095 in quantities of 100.

\*\$1095 in quantity, greater than 100.



Company Name : **INFOTON INCORPORATED**  
Headquarters Address : **2nd Avenue, Burlington, MA 01803**  
Headquarters Contact : **Inside Sales**

Telephone Number: **(617) 272-6660****Key Features**

Screen Size (Diagonal) : **12 inch**  
Maximum Characters Per Line : **80**  
Maximum Lines on Screen : **24**  
Lower Case Available : **Yes (standard)**  
Transmission Speed (char./sec.) : **110 - 19,200 BPS**  
Transmission Code : **ASCII**  
Internal Buffer : **Optional**  
Weight : **40 lbs.**  
Purchase Cost (Without Coupler) : **\$ 849**  
Monthly Cost for Service Contract : **\$ n.a.**  
Monthly Cost for One Year Lease (With Service) : **\$ n.a.**  
Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**  
Year Introduced : **1978**  
Approximate Number Installed : **n.a.**  
Serviced By : **Factory**

Model: **I-100****General Description**

The Infoton I-100 display terminal is a ruggedly designed high-reliability terminal which employs a powerful Z80 microprocessor to achieve a new standard of functionality in low priced terminals.

The I-100 includes a solid-state keyboard with numeric pad and cursor-control pad, two industry-standard asynchronous serial interfaces, a 12-inch, high resolution, low glare display monitor and rugged all-steel packaging. Also included as standard are a 32 character line drawing set, 25th status line and auxiliary printer output.

The I-100 provides a number of formatting and annunciation features including dual intensity, reverse video, line editing and an addressable/readable cursor. Available options include block mode transmission with protected formats, user programmable function keys and composite video output.

Company Name : PERKIN-ELMER DATA SYSTEMS, TERMINALS DIVISION

Headquarters Address : Route 10 and Emery Avenue, Randolph, NJ 07801

Headquarters Contact : Marilyn Johnson Telephone Number: (201) 366-5550-62

## Key Features

Screen Size (Diagonal) : 12 inch

Maximum Characters Per Line : 80

Maximum Lines on Screen : 24

Lower Case Available : Yes, with full descenders

Transmission Speed (char./sec.) : Up to 960 cps

Transmission Code : Full ASCII

Internal Buffer : Yes, 1920 characters

Weight : 50 lbs. (22.7 kg)

Purchase Cost (Without Coupler) : \$ 893<sup>1</sup>

Monthly Cost for Service Contract : \$ 15

Monthly Cost for One Year Lease (With Service) : \$ n.a.

Monthly Cost for Three Year Lease (With Service) : \$ n.a.

Year Introduced : 1977

Approximate Number Installed : 4,000

Serviced By : Customer Service Division  
Perkin-Elmer Terminals

Model: MODEL 1100



## General Description

The Model 1100 is an interactive video display terminal with a 24 line by 80 column format. The 9 x 12 character matrix, high-resolution monitor, block cursor, eye-level screen and anti-glare filter make it easy to use. It displays all 128 ASCII characters including control characters in its transparent mode, for fast and easy software debugging. The host computer can position the cursor either relatively or absolutely and can also read the cursor's actual position. The familiar typewriter-like keyboard includes keys for shift lock, upper case only, tab, backtab, print, and repeat. Each key repeats automatically if held down longer than 1 second. Tabs can be set at any or all of the 80 positions. The Model 1100 uses Teletype™ communications protocol. The standard interface is RS232. Baud rate is switchable from 75 to 9600. Switches are also provided for one or two stop bits, four parity options, and full or half duplex operation. The purchase price above includes one of four communication cables, depending on the interface requirements.

<sup>1</sup>Quantity 100.



Company Name : PERKIN-ELMER DATA SYSTEMS, TERMINALS DIVISION  
Headquarters Address : Route 10 and Emery Avenue, Randolph, NJ 07801  
Headquarters Contact : Marilyn Johnson Telephone Number: (201) 366-5550-62

**Key Features**

Screen Size (Diagonal) : 12 inch  
Maximum Characters Per Line : 80  
Maximum Lines on Screen : 24  
Lower Case Available : Yes, with full descenders  
Transmission Speed (char./sec.) : Up to 960 cps  
Transmission Code : Full ASCII  
Internal Buffer : Yes, 1920 characters  
Weight : 50 lbs. (22.7 kg)  
Purchase Cost (Without Coupler) : \$ 1361<sup>1</sup>  
Monthly Cost for Service Contract : \$ 24  
Monthly Cost for One Year Lease (With Service) : \$ n.a.  
Monthly Cost for Three Year Lease (With Service) : \$ n.a.  
Year Introduced : 1977  
Approximate Number Installed : 5,000  
Served By : Customer Service Division  
Terminals Division

Model: OWL 1200

**General Description**

The Model 1200 is an editing terminal oriented to transaction processing. Its editing features include insert character string, delete character, insert/delete line, clear line/field, clear unprotected, and clear all. Programmable field attributes to control data entry are protect/unprotect, non-display (passwords), and numeric only. Attributes that modify data presentation for emphasis are: half-bright, inverse video, and blink, with all combinations available. The host can position the cursor anywhere, and can read its location. In the block mode, the host can call for all data, unprotected data, or operator modified fields only, by line, by message, or full page. A request to send mode is available, and both features minimize host and line loading. The display uses a high-resolution monitor, a highly legible 9x12 character matrix providing true descenders on lower-case letters, eye-level, anti-glare screen. Options include form drawing ability, international character sets, reprogrammable function keys, shiftable to 32. The familiar, typewriter-like keyboard has automatic repeat ability and separate key pads for cursor positioning, optional printer and tab control numeric data entry, editing, and terminal mode control. Communications are RS232, with switchable baud rates from 75 to 9600. Switches are also provided for the number of stop bits, four parity options, full/half-duplex, automatic tabs over attribute bytes and tab controls, and inverse video. The price of the unit includes one of 5 communication cables.

<sup>1</sup>Quantity 100



Company Name : **RACAL-MILGO INFORMATION SYSTEMS, INC.**

Headquarters Address : **8600 N.W. 41 Street, Miami, FL 33166**

Headquarters Contact : **John Denhardt**

Telephone Number: **(305) 592-8600**

**Key Features**

Screen Size (Diagonal) : **15 inch**  
Maximum Characters Per Line : **80**  
Maximum Lines on Screen : **24**  
Lower Case Available : **Standard**  
Transmission Speed (char./sec.) : **2400 - 9600**  
Transmission Code : **SYNC HONEYWELL**  
Internal Buffer : **6K**  
Weight : **54 lbs.**  
Purchase Cost (Without Coupler) : **\$ 4,850**  
Monthly Cost for Service Contract : **\$ 1**  
Monthly Cost for One Year Lease (With Service) : **\$ 155**  
Monthly Cost for Three Year Lease (With Service) : **\$ 130**  
Year Introduced : **1977**  
Approximate Number Installed : **200**  
Serviced By : **RACAL-MILGO, INC.**

Model: **SYSTEM 400 MODEL 1**

**General Description****COMMUNICATIONS**

**Speeds** 2400 to 9600 bits per second  
**Discipline** Synchronous  
**Protocols** Honeywell, VIP (Poll and Select only)  
**Links** 2 or 4 wire, dial or dedicated, point-to-point or multidropped

**FEATURES**

- Fully buffered communications
- Repeat (all keys)
- Protected information
- Dual Intensity display
- Selective data blink or blank
- Tab set and clear
- Numeric only or alphanumeric field control
- 30 computer commands for terminal control
- Local printing
- Full diagnostics
- Full cursor controls
- Formatted data entry
- Upper & Lower case display
- Reverse video
- Underlining
- Selective non-print on non-transmit fields
- Character and line insert and delete
- Fully buffered addressable printer (optional)
- Integrated communications monitor concurrent with normal operations

<sup>1</sup> Monthly cost for service contract based on number and location

Company Name : **RACAL-MILGO INFORMATION SYSTEMS, INC.**

Headquarters Address : **8600 N.W. 41 Street, Miami, FL 33166**

Headquarters Contact : **John Denhardt** Telephone Number: **(305) 592-8600**

## Key Features

Screen Size (Diagonal) : **15 inch**

Maximum Characters Per Line : **80**

Maximum Lines on Screen : **24**

Lower Case Available : **Standard**

Transmission Speed (char./sec.) : **9600 BPS**

Transmission Code : **1**

Internal Buffer : **6K**

Weight : **54 lbs.**

Purchase Cost (Without Coupler) : **\$ 4,850**

Monthly Cost for Service Contract : **\$ 2<sup>2</sup>**

Monthly Cost for One Year Lease (With Service) : **\$ 155**

Monthly Cost for Three Year Lease (With Service) : **\$ 130**

Year Introduced : **1977**

Approximate Number Installed : **500**

Serviced By : **RACAL-MILGO, INC.**

Model: **SYSTEM 400 MODEL 2**



## General Description

### FEATURES:

- Fully buffered communications
- Repeat (all keys)
- Protected information
- Dual intensity display
- Selective data blink or blank
- Tab set and clear
- Character and line insert and delete
- Fully buffered addressable printer (optional)
- Integrated communications monitor concurrent with normal operations
- Full cursor controls
- Formatted data entry
- Upper & Lower case display
- Reverse video cursor
- Underlining
- Numeric only or alphanumeric field control
- 30 computer commands for terminal control
- Local printing
- Full diagnostics

### <sup>1</sup> COMMUNICATIONS

Speeds	TO-9600 bits per second
Discipline	Asynchronous or synchronous
Protocols	Univac Uniscope
Links	2 or 4 wire, dial or dedicated, Point-to-point multidropped

<sup>2</sup> Monthly cost for service contract based on number and location

Date: **May, 1979**

Submitted By: **Jim Tedrick, Product Manager**





Company Name : **RACAL-MILGO INFORMATION SYSTEMS, INC.**

Headquarters Address : **8600 N.W. 41 Street, Miami, FL 33166**

Headquarters Contact : **John Denhardt**

Telephone Number: **(305) 592-8600**

**Key Features**

Screen Size (Diagonal) : **15 inch**  
Maximum Characters Per Line : **80**  
Maximum Lines on Screen : **24**  
Lower Case Available : **Standard**  
Transmission Speed (char./sec.) : **9600 BPS**  
Transmission Code : **ASCII or EBCDIC**  
Internal Buffer : **6K**  
Weight : **46 lbs.**  
Purchase Cost (Without Coupler) : **\$ 4,950**  
Monthly Cost for Service Contract : **\$ 1**  
Monthly Cost for One Year Lease (With Service) : **\$ 160**  
Monthly Cost for Three Year Lease (With Service) : **\$ 130**  
Year Introduced : **1977**  
Approximate Number Installed : **1000**  
Serviced By : **RACAL-MILGO, INC.**

Model: **SYSTEM 400 MODEL 3**

**General Description****STANDARD COMPATIBLE FEATURES INCLUDE:**

- Single or dual buffering
- Local print capability
- Built-in data monitor diagnostics
- Choice of 160 cps or 200 lpm printer
- 4800 bps dial operation
- Expanded editing controls
- Compact display unit
- CRT tilt and swivel features
- Modular construction
- Nationwide customer support

<sup>1</sup> Monthly cost for service contract based on location and number

Date: **May, 1979**

Submitted By: **Jim Tedrick, Product Manager**

Company Name : RACAL-MILGO INFORMATION SYSTEMS, INC.

Headquarters Address : 8600 N.W. 41 Street, Miami, FL 33166

Headquarters Contact : John Denhardt

Telephone Number: (305) 592-8600

## Key Features

Screen Size (Diagonal) : 15 inch

Maximum Characters Per Line : 80

Maximum Lines on Screen : 24

Lower Case Available : Standard

Transmission Speed (char./sec.) : 110/2400 BPS

Transmission Code : 8A1

Internal Buffer : 6K

Weight : 54 lbs.

Purchase Cost (Without Coupler) : \$ 4,585

Monthly Cost for Service Contract : \$ 1

Monthly Cost for One Year Lease (With Service) : \$ 161

Monthly Cost for Three Year Lease (With Service) : \$ 117

Year Introduced : 1976

Approximate Number Installed : 2000

Serviced By : RACAL-MILGO, INC.

Model: 40+ MPL



## General Description

### FEATURES:

- Teletype\* Model 40/3 Compatibility - Keyboard, operation, data display and Type 8A1 line protocol
- Field Selectable options enable customizing operation of keyboard terminal and line protocol
- Complete equipment modularity for optimum placement
- 1200, 1800 or 2400 BPS operation
- Built-in privacy secure line monitor for testing
- Remotely controllable diagnostic tests
- Communications status indicators
- Audible alarms
- Large, 7 x 11 dot matrix for display of fully formed lower case letters and control characters
- Additional text edit keys
- Remotely addressable cursor positioning
- Dual intensity, highlighted and underlined character display
- 1920 character screen (Two or three screens)

\* A registered trademark of Teletype Corporation

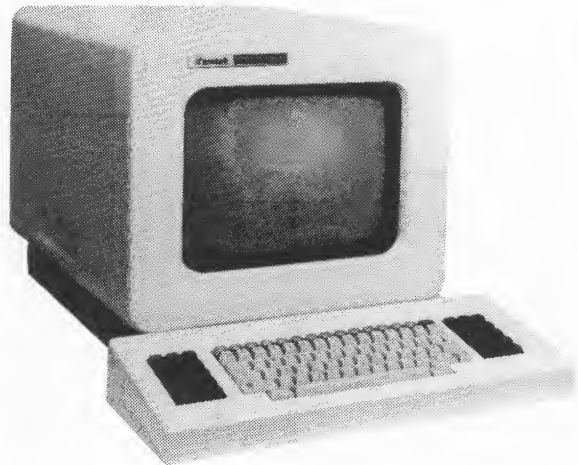
<sup>1</sup> Monthly cost for service contract based on number and location

Date: May, 1979

Submitted By: Jim Tedrick, Product Manager

**Company Name** : **RAMTEK CORPORATION****Headquarters Address** : **585 No. Mary Avenue, Sunnyvale, CA 94086****Headquarters Contact** : **Beverly Toms****Telephone Number:** **(408) 735-8400****Key Features**

**Screen Size (Diagonal)** : **13 inch**  
**Maximum Characters Per Line** : **80**  
**Maximum Lines on Screen** : **24**  
**Lower Case Available** : **Yes**  
**Transmission Speed (char./sec.)** : **110-19200 Baud**  
**Transmission Code** : **Async., ASCII Duplex**  
**Internal Buffer** : **1000 Bytes**  
**Weight** : **190 lbs.**  
**Purchase Cost (Without Coupler)** : **\$ 5,500**  
**Monthly Cost for Service Contract** : **\$ Variable**  
**Monthly Cost for One Year Lease (With Service)** : **\$ n.a.**  
**Monthly Cost for Three Year Lease (With Service)** : **\$ n.a.**  
**Year Introduced** : **1978**  
**Approximate Number Installed** : **New Product**  
**Serviced By** : **Ramtek Corp.**

**Model:** **RAMTEK 6110 COLORGRAPHICS****General Description**

The model 6110 Colorgraphics Computer Terminal is a medium resolution full color raster scan graphic terminal. The graphics resolution is a full 320(X) by 240(Y). Character generation is accomplished either in bit map form or by a real-time generator. Interfacing is accomplished via a high level English type language using printable ASCII characters. Options are available including RAM memory expansion (to 512K bytes maximum), interactive joystick, and packaged software.

**Date:** **May, 1979****Submitted By:** **Beverly Toms, Advertising Manager**



Company Name : **RAMTEK CORPORATION**

Headquarters Address : **585 N. Mary Avenue, Sunnyvale, CA 94086**

Headquarters Contact : **R.E. Peterson** Telephone Number: **(408) 735-8400**

## Key Features

Screen Size (Diagonal) : **13 inch**

Maximum Characters Per Line : **72 or 80**

Maximum Lines on Screen : **25**

Lower Case Available : **Yes**

Transmission Speed (char./sec.) : **110 - 9600 baud**

Transmission Code : **Serial Async. ASCII Duplex**

Internal Buffer : **2K Bytes**

Weight : **150 lbs.**

Purchase Cost (Without Coupler) : **\$ 9,950**

Monthly Cost for Service Contract : **\$ Variable**

Monthly Cost for One Year Lease (With Service) : **\$ n.a.**

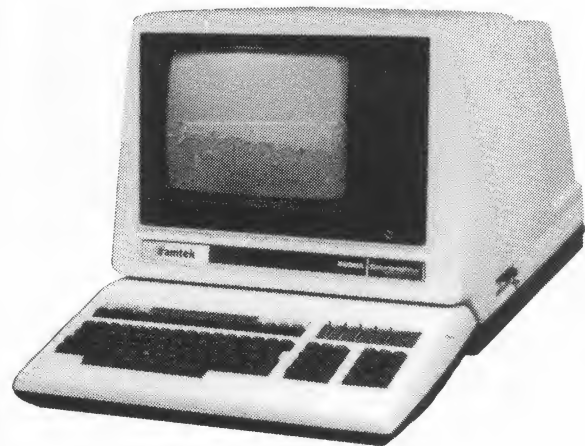
Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**

Year Introduced : **1977**

Approximate Number Installed : **(Just introduced)**

Serviced By : **Manufacturer**

Model: **RAMTEK 6200A COLORGRAPHICS**



## General Description

The Model 6200A Colorgraphic™ computer terminal offers high resolution color graphics and alphanumerics at an affordable price. The terminal is very easy to program with ASCII text strings and is TTY compatible. Resolution is 512 elements by 256 lines. The independently refreshed alphanumerics are addressable anywhere within a 25 row by 80 character matrix and the characters can be individually erased, modified or updated. A user can select any eight out of a possible 64 colors for both graphics and alphanumerics. Options are available including extended RAM memory, interactive joystick and packaged software.

Company Name : **RAMTEK CORPORATION**

Headquarters Address : **585 N. Mary Avenue, Sunnyvale, CA 94086**

Headquarters Contact : **Beverly Toms** Telephone Number: **(408) 735-8400**

## Key Features

Screen Size (Diagonal) : **19 inch**

Maximum Characters Per Line : **80**

Maximum Lines on Screen : **40**

Lower Case Available : **Yes**

Transmission Speed (char./sec.) : **110 - 19.2K Baud**

Transmission Code : **Async., ASCII Duplex**

Internal Buffer : **1000 Bytes**

Weight : **230 lbs.**

Purchase Cost (Without Coupler) : **\$ 25,000**

Monthly Cost for Service Contract : **\$ Variable**

Monthly Cost for One Year Lease (With Service) : **\$ n.a.**

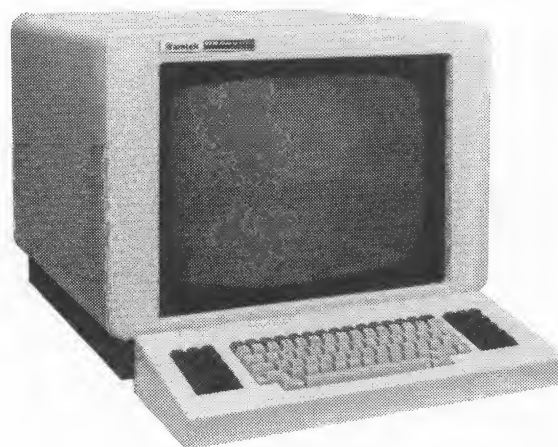
Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**

Year Introduced : **1978**

Approximate Number Installed : **New Product**

Serviced By : **Ramtek Corp.**

Model: **RAMTEK 6310 COLORGRAPHICS**



## General Description

The model 6310 Colorgraphics Computer Terminal is an ultra high resolution full color raster scan graphic terminal. The graphics resolution is a full 1K by 1K with any 800(X) by 600(Y) points viewable at any given time via hardware Pan/Zoom. The hardware will support 10<sup>12</sup> colored vectors simultaneously without flicker. Character generation is accomplished either in bit map form (3 or 4 pages of 6000 or more characters) or by the real-time 80x40 character generator. Interfacing is accomplished via a high level English type language using printable ASCII characters. Options are available including RAM memory expansion (to 512K bytes maximum), interactive joystick, and packaged software.

Company Name : **TEKTRONIX, INCORPORATED**

Headquarters Address : **P.O. Box 500, Beaverton, OR 97077**

Headquarters Contact : **John Kadel**

Telephone Number: **(503) 682-3411**

## Key Features

Screen Size (Diagonal) : **12 inches**

Maximum Characters Per Line : **80**

Maximum Lines on Screen : **34**

Lower Case Available : **Yes**

Transmission Speed (char./sec.) : **75-9600 baud**

Transmission Code : **RS-232-C**

Internal Buffer : **4K std. 8, 16, 32K opt.**

Weight : **58 lbs.**

Purchase Cost (Without Coupler) : **\$ 2,995**

Monthly Cost for Service Contract : **\$ 21**

Monthly Cost for One Year Lease (With Service) : **\$ 157**

Monthly Cost for Three Year Lease (With Service) : **\$ 120**

Year Introduced : **1977**

Approximate Number Installed : **n.a.**

Serviced By : **Tektronix, Inc.**

Model: **TEKTRONIX 4024**



## General Description

The 4024 is designed to allow fast, straightforward interaction with host computers and to provide efficiency in manipulating alphanumeric data. This terminal allows the user to write and edit programs. Text editing and forms fillout are other features.

The keyboard conforms with the familiar office typewriter configuration. Predefined editing keys allow insertion and deletion of lines and characters. Thirteen user definable keys plus most other keys can be defined to generate a command or character string at the touch of a finger.

The 4024 Forms Ruling Option can duplicate any source document. To make data entry and editing easier, the display can be divided into two separate display areas, each with independent scrolling. Visual attributes include enhanced, blank and blinking fields. Logical attributes include protected fields, modified, alphanumeric or numeric only.

Operation of the 4024 is easy for anyone, because the 4024 uses English language commands based on the ASCII character set. The green-on-black screen with adjustable brightness is easy on the eyes, an important feature for the experienced operator.

### Options Include:

- Additional Display Memory
- Current Loop I/F
- Peripheral I/F
- Ruling Characters
- IBM Polling I/F
- 220V 50Hz

Date: **May, 1979**

Submitted By: **Linda Thomas, Time Sharing Mkt. Manager**



Company Name : **TEKTRONIX, INCORPORATED**

Headquarters Address : **P.O. Box 500, Beaverton, OR 97077**

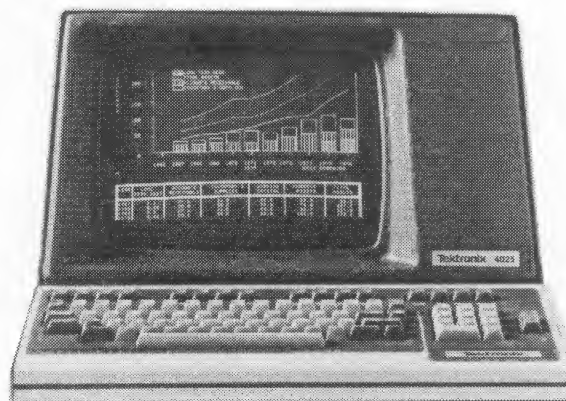
Headquarters Contact : **John Kadel**

Telephone Number: **(503) 682-3411**

## Key Features

Screen Size (Diagonal) : **12 inches**  
Maximum Characters Per Line : **80**  
Maximum Lines on Screen : **34**  
Lower Case Available : **Yes**  
Transmission Speed (char./sec.) : **75-9600 baud**  
Transmission Code : **8 bit ASCII**  
Internal Buffer : **4K std., 8, 16, 32K opt.**  
Weight : **60 lbs.**  
Purchase Cost (Without Coupler) : **\$ 3,595**  
Monthly Cost for Service Contract : **\$ 21**  
Monthly Cost for One Year Lease (With Service) : **\$ 189**  
Monthly Cost for Three Year Lease (With Service) : **\$ 143**  
Year Introduced : **1977**  
Approximate Number Installed : **n.a.**  
Serviced By : **Tektronix, Inc.**

Model: **TEKTRONIX 4025**



## General Description

The 4025 takes applications beyond alphanumeric. This terminal has all the capability of the 4024 plus the unique ability to expand from basic alphanumeric to forms ruling and then into graphics. With all of the available options, the 4025 provides unmatched report generation capability.

For the first time, users can create and store multiple graphs in the terminal memory, create more than one graph on a single page, and scroll graphics along with alphanumeric information.

PLOT 10 Easy Graphing software allows interactive creation of bar charts with multiple shadings, histograms, log plots, pie charts and period axes. All of these may contain a variety of labeling options. With this format flexibility, it becomes easy to create multiple pages of reports containing alphanumeric, forms and graphs.

Using the unique Tektronix 4631 Hard Copy Unit, the user can copy screen and buffered displays of up to 80 characters by 53 lines. The 8½ x 11 inch copies are clean, dry and sharp. For detailed camera-ready copies of graphs and alphanumeric data, the 4025 is compatible with the Tektronix 4660 Series of Interactive Digital Plotters.

The 4924 Digital Cartridge Tape Driver provides an inexpensive method of storing forms, graphs and other data.

Using the optional 4025 Polling Controller, multiple terminals can be polled on a single data communications line.

Company Name : **TEKTRONIX, INCORPORATED**

Headquarters Address : **P.O. Box 500, Beaverton, OR 97077**

Headquarters Contact : **John Kadel**

Telephone Number: **(503) 682-3411**

**Key Features**

Screen Size (Diagonal) : **13 inches**

Maximum Characters Per Line : **80**

Maximum Lines on Screen : **34**

Lower Case Available : **Yes**

Transmission Speed (char./sec.) : **75-9600 baud**

Transmission Code : **8 bit ASCII**

Internal Buffer : **8K std., 16K, 32K opt.**

Weight : **100 lbs.**

Purchase Cost (Without Coupler) : **\$ 8,695**

Monthly Cost for Service Contract : **\$ 1**

Monthly Cost for One Year Lease (With Service) : **\$ 522**

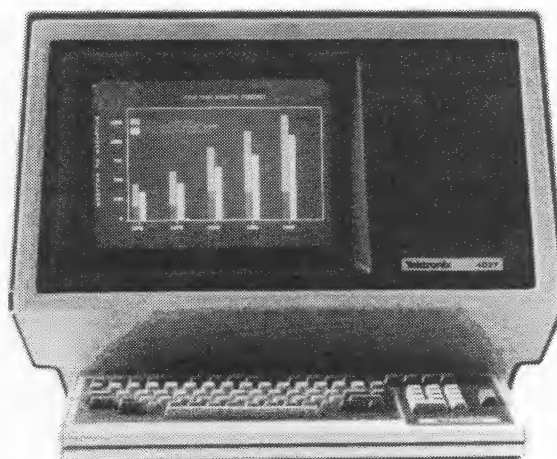
Monthly Cost for Three Year Lease (With Service) : **\$ 348**

Year Introduced : **1978**

Approximate Number Installed : **n.a.**

Serviced By : **Tektronix, Inc.**

Model: **TEKTRONIX 4027**


**General Description**

The 4027 Color Graphics Terminal adds a color dimension to graphics. This compact, high performance computer terminal provides a raster scan display. It has the unique capabilities of scrolling graphics and alphanumeric, with the added feature of color.

Colors are selected from a 64 color palette with up to eight colors displayed simultaneously on the screen. The 4027 uses the hue, lightness, and saturation method for specifying color.

Features of the 4027 include coloring vectors, characters, symbols, and filling polygons. The firmware enables another color to border the polygon. When filling polygons, the 4027's firmware allows selection of up to 120 different patterns or color combinations for special applications. Graphic input capability consists of a graphic crosshair cursor controlled by graphic cursor keys.

The standard video signal output allows connection of the 4027 to external video displays for group viewing and presentations.

A gray scale representation of the 4027 color display can be created with a Tektronix 4632 Hard Copy Unit. Detailed, camera-ready color copies of graphs and alphanumeric data are produced with the Tektronix 4660 Series of Interactive Digital Plotters.

Software support is provided by Tektronix PLOT 10 Easy Graphing, and the PLOT 10 Interactive Graphics Library, (IGL). The IGL package is highly modular and offers all the support generally required in graphic applications.

<sup>1</sup> Monthly Cost for Service Contract: \$100/month 1st year; \$80/month 2nd year.

Company Name : **VARDON & ASSOCIATES, INC.**

Headquarters Address : **930 N. Beltline Road, Irving, TX 75061**

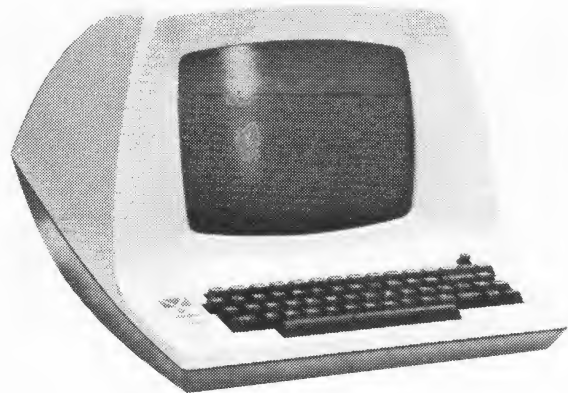
Headquarters Contact : **Joseph Gaynor**

Telephone Number: **(800) 527-7700**

## Key Features

Model: **ADM-3A**

Screen Size (Diagonal) : **12 inch**  
Maximum Characters Per Line : **80**  
Maximum Lines on Screen : **24**  
Lower Case Available : **Yes**  
Transmission Speed (char. /sec.) : **0-19,200**  
Transmission Code : **ASCII**  
Internal Buffer : **n.a.**  
Weight : **32 lbs.**  
Purchase Cost (Without Coupler) : **\$ 875**  
Monthly Cost for Service Contract : **\$ 8 (On Annual Basis)**  
Monthly Cost for One Year Lease (With Service) : **\$ 49.50**  
Monthly Cost for Three Year Lease (With Service) : **\$ 39.63 (Lease Purchase)**  
Year Introduced : **1977**  
Approximate Number Installed : **2,000**  
Serviced By : **TAB**



## General Description

- Teletypewriter compatible
- 12-inch rectangular screen with large easy-to-read characters
- 24-line display with full 80 character lines
- 59-key keyboard designed to office teletypewriter layout, and containing all teletypewriter data and control keys
- Switches at front panel and on logic board permit easy selection of performance features
- Optional numeric keypad
- RS-232C and current loop computer interfaces (switchable)
- Switchable communication rates, 76 to 19200 baud
- Full/half duplex asynchronous operation
- Switchable character format
- Optional automatic "Answer Back" capability
- Displays 64 characters or, optionally, 95 upper/lower case characters
- Data entry on progressive lines, top to bottom, or on bottom line, with upward page scroll
- Complete cursor control, including direct cursor addressing
- End-of-line audible tone
- Selectable automatic NEW LINE
- Compact Size
- Modular construction for minimum upkeep and easy maintenance.

Date: **May, 1979**

Submitted By: **Joseph Gaynor, National Sales Manager**



Company Name : **VOLKER-CRAIG LTD.**

Headquarters Address : **266 Marsland Drive, Waterloo, Ontario, N2J 3Z1**

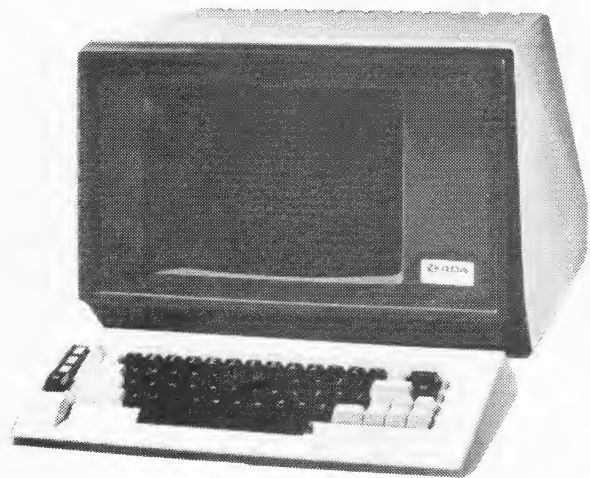
Headquarters Contact : **Alan Werenko**

Telephone Number: **(519) 884-9300**

**Key Features**

Screen Size (Diagonal) : **12 inch**  
Maximum Characters Per Line : **80**  
Maximum Lines on Screen : **24**  
Lower Case Available : **Yes**  
Transmission Speed (char./sec.) : **110 to 19,200 baud**  
Transmission Code : **ASCII**  
Internal Buffer : **No**  
Weight : **40 lbs.**  
Purchase Cost (Without Coupler) : **\$ 995**  
Monthly Cost for Service Contract : **\$ n.a.**  
Monthly Cost for One Year Lease (With Service) : **\$ n.a.**  
Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**  
Year Introduced : **1978**  
Approximate Number Installed : **4000**  
Serviced By : **Manufacturer & Authorized Rep**

Model: **VC 404 THE STANDARD**

**General Description**

The Volker-Craig VC404 is a low cost teletype compatible terminal with numerous standard features designed to meet the needs of the time-share user.

A detachable keyboard, tactile feedback, auto repeat, typewriter layout, cursor control cluster, and switch selectable upper/lower case for operator convenience are standard.

Cursor addressing, Transparent/Tape mode for displaying all 128 ASCII codes and composite video output for remote monitors are standard features.

Options include a bidirectional serial peripheral interface, numeric pad and function keys, APL character set (non overstrike), colored display screens and numerous foreign keyboards and character sets.

Call Volker-Craig Ltd. or a local distributor for more information on prices, quantity discounts and delivery.

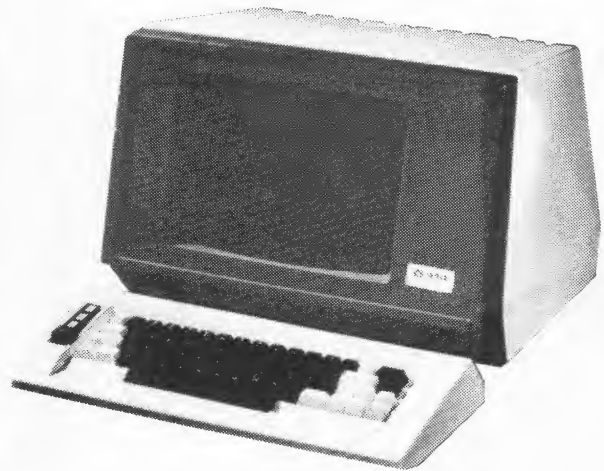


Company Name : VOLKER-CRAIG, LTD.  
Headquarters Address : 266 Marsland Drive, Waterloo, Ontario, N2J 3Z1  
Headquarters Contact : Alan Werenko Telephone Number: (519) 884-9300

**Key Features**

Screen Size (Diagonal) : 12 inch  
Maximum Characters Per Line : 80  
Maximum Lines on Screen : 24  
Lower Case Available : Yes  
Transmission Speed (char./sec.) : 110 to 19,200 baud, 8 steps  
Transmission Code : ASCII  
Internal Buffer : Yes, 19,200 char.  
Weight : 40 lbs.  
Purchase Cost (Without Coupler) : \$ 1175  
Monthly Cost for Service Contract : \$ n.a.  
Monthly Cost for One Year Lease (With Service) : \$ n.a.  
Monthly Cost for Three Year Lease (With Service) : \$ n.a.  
Year Introduced : 1978  
Approximate Number Installed : 800  
Served By : Manufacturer & Authorized Rep

Model: VC 414 THE EDITOR

**General Description**

The Volker-Craig VC414 is a microprocessor based, fully buffered editing data terminal. A detachable keyboard, non glare screen, quiet operation, fast transmission speed, character highlighting, and numerous standard features make it an extremely cost effective terminal for both OEM's and end users.

The VC414 Block Mode allows for formatted data entry and complete local editing before transmission of all or variable data to the computer. Multi-level display and blinking/reverse video let the operator or programmer highlight forms, graphs, and messages.

Keyboard reliability, tactile feedback, auto repeat, switch selectable upper/lower case, editing keys, numeric pad and function keys, and a complete cursor control key cluster for operator convenience are standard. Options including serial and parallel peripheral interfaces and colored display screens, provide maximum flexibility to meet each user's particular requirements.

Both domestic and export versions of the VC414 are available now. Write or call us today for more information on prices, quantity discounts and delivery.

Company Name : WESTERN UNION DATA SERVICES

Headquarters Address : 70 McKee Drive, Mahwah, NJ 07430

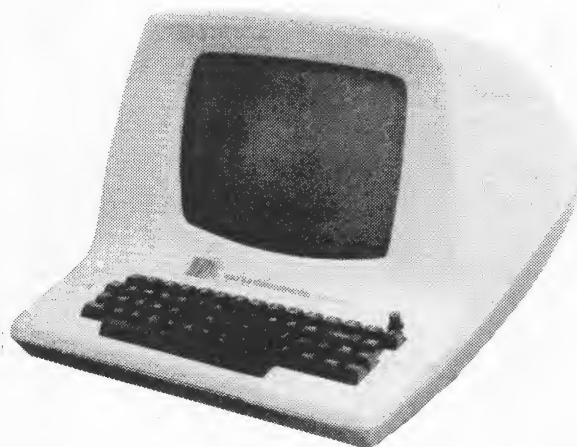
Headquarters Contact : J. A. Steele

Telephone Number: (201) 529-1170

## Key Features

Model: VIDEO 100

Screen Size (Diagonal)	:	12 inch
Maximum Characters Per Line	:	80
Maximum Lines on Screen	:	24
Lower Case Available	:	Optional
Transmission Speed (char./sec.)	:	75 to 19,200 Baud
Transmission Code	:	ASCII
Internal Buffer	:	No
Weight	:	25 lbs.
Purchase Cost (Without Coupler)	:	\$ 860
Monthly Cost for Service Contract	:	\$ 20
Monthly Cost for One Year Lease (With Service)	:	\$ 65
Monthly Cost for Three Year Lease (With Service)	:	\$ n.a.
Year Introduced	:	1975
Approximate Number Installed	:	4,000
Serviced By	:	Western Union Data Services



## General Description

The Video 100 is an interactive display terminal - a device used to enter, display and send information to a remote station or computer, and to receive and display information from the remote end. It is available in EIA, Acoustically Coupled or Data Access Arrangement for line interface.

The Video 100 offers: switch selectable half- or full-duplex operation, bottom line data entry with upward page scroll and end-of-line audible tone. It can be employed in a multi-terminal environment where applications require fast, visual display of data or in an environment which requires quiet terminal for noise-free operation.

Also, the Video 100 can be associated with any of our existing teleprinters or magnetic tape cassette and our Flexible Disk Smarts Communications Controller.



Company Name : **WESTERN UNION DATA SERVICES**

Headquarters Address : **70 McKee Drive, Mahwah, NJ 07430**

Headquarters Contact : **J. A. Steele**

Telephone Number: **(201) 529-1170**

## Key Features

Screen Size (Diagonal) : **12 inch**

Maximum Characters Per Line : **80**

Maximum Lines on Screen : **25**

Lower Case Available : **Yes, standard**

Transmission Speed (char./sec.) : **50 - 19,200 BPS**

Transmission Code : **ASCII**

Internal Buffer : **Yes**

Weight : **45 lbs.**

Purchase Cost (Without Coupler) : **\$ 1,850**

Monthly Cost for Service Contract : **\$ 25**

Monthly Cost for One Year Lease (With Service) : **\$ 100**

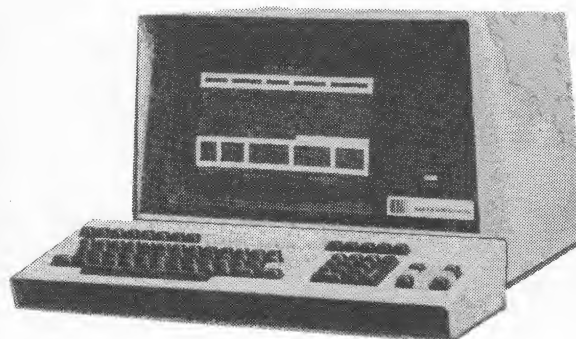
Monthly Cost for Three Year Lease (With Service) : **\$ 85**

Year Introduced : **1978**

Approximate Number Installed : **75-100**

Serviced By : **Western Union Data Services**

Model: **VIDEO 200**



## General Description

The Video 200, designed around an advanced microprocessor, is a multi-functional, buffered, fully-featured interactive display terminal. A line-drawing set, consisting of 31 characters allows the presentation of complete formats on the Video 200 screen. The formats presented on the display may be composed of protected fields, tabs, reverse video, half intensity, underlining, blinking and various combinations of each display feature.

The Video 200 offers: Switch-Selectable data rates of up to 19,200 BPS, tabbing and back tabbing, erase page/field, inserts and deletes of character and line. Also, it will transmit character, page, field and selected fields. A detached keyboard consisting of a typewriter-like keyboard, 10-key numeric pad, cursor-positioning keys and eight function keys are standard features on the Video 200.

The optional features for the Video 200 are: Two additional pages of memory, a serial printer interface (buffered and unbuffered), polling and selection, Hazeltine 2000 emulation and time sharing. Also, the Video 200 is compatible with any of our existing teleprinters, magnetic tape cassette units and our flexible-disk Smarts communications controller. In addition, it is supported by Termicare®, our toll-free dial-up service and diagnostic center.

Date: **May, 1979**

Submitted By: **Joseph A. Steele, Manager - Sales Support**

Company Name : **WORDSTREAM CORPORATION**

Headquarters Address : **300 East 44th Street, New York, NY 10017**

Headquarters Contact : **George W. Saupe**

Telephone Number: **(212) 557-8324**

## Key Features

Screen Size (Diagonal) : **22 inches**  
Maximum Characters Per Line : **80**  
Maximum Lines on Screen : **24**  
Lower Case Available : **Yes**  
Transmission Speed (char./sec.) : **1**  
Transmission Code : **96 EBCDIC**  
Internal Buffer : **Yes**  
Weight : **2**  
Purchase Cost (Without Coupler) : **\$ 3,040**  
Monthly Cost for Service Contract : **\$ 16.50**  
Monthly Cost for One Year Lease (With Service) : **\$ n.a.**  
Monthly Cost for Three Year Lease (With Service) : **\$ 81.50**  
Year Introduced : **1975**  
Approximate Number Installed : **17,000**  
Serviced By : **SORBUS**

Model: **G77**



## General Description

A fully plug-plug compatible (with 3277 Model 2) CRT display station for use with all of the following IBM systems employing the 3270 configuration: Systems/360, Systems/370, Systems/3, 3790 Communications Systems.

### FEATURES:

- **USES EXISTING IBM CABLES** - No additional expense when converting from IBM to Wordstream.
- **AUTOMATIC VISUAL INDICATION** - An exclusive G77 standard feature. It is activated by the operator to indicate a dot in each display position in which data can be entered.
- **REPEAT KEY** - A standard feature not available on IBM units. It is used with any character key to write that character repeatedly on the screen.
- **BLINKING CURSOR** - A no-cost option when specified at time of order. It enables the operator to locate the cursor's position on the screen.
- **EBCDIC KEYBOARDS** - The user may choose from six styles of keyboards to attain maximum utilization based on application and/or system.
- **AUDIBLE ALARM** - (Optional) With this feature, a tone sounds to alert the operator of special situations.
- **KEY (SECURITY) LOCK** - (Optional. One-time charge) Permits only authorized personnel access to the terminal.
- **HOME KEY** - A standard feature not available on IBM units. It moves the cursor to the first unprotected display position on the screen.

<sup>1</sup> Solely dependent on IBM specifications and equipment.

<sup>2</sup> Terminal-57 lbs., Keyboard-6 lbs.

## PRINTERS

Agile Corporation	
A-2 .....	XIV.020
American Telephone & Telegraph Co.	
DATASPEED® 40 .....	XIV.040
American Used Computer Corporation	
CENTRONICS 101A, 102A, 103 .....	XIV.060
Dataroyal, Inc.	
IPS - 7000 SERIES .....	XIV.080
Data Terminals and Communications	
DTC 200/RO .....	XIV.100
General Electric - Data Communication Products	
TERMINET® 200 MATRIX .....	XIV.120
Hewlett-Packard Company	
2631A .....	XIV.140
2631G .....	XIV.141
Honeywell Information System, Inc.	
PRU1001, 1002, 1003, 1005 .....	XIV.160
NEC Information Systems, Inc.	
5510 RO "SPINWRITER" .....	XIV.180
5515 RO "SPINWRITER" .....	XIV.181
Perkin-Elmer Terminals Division	
650 .....	XIV.200
Potter Instrument Company, Inc.	
LP6303, 6304, 6305, 6306 .....	XIV.220
Printronic, Inc.	
P/600, P/300, P/150 .....	XIV.240
Qume Corporation	
S5/45, S5/55 .....	XIV.260
Racal-Milgo Information Systems, Inc.	
TP403 .....	XIV.280
TP404 .....	XIV.281
Tektronix	
4642 .....	XIV.300



Company Name : **AGILE CORPORATION**

Headquarters Address : **1050 Stewart Dr., Sunnyvale, CA 94086**

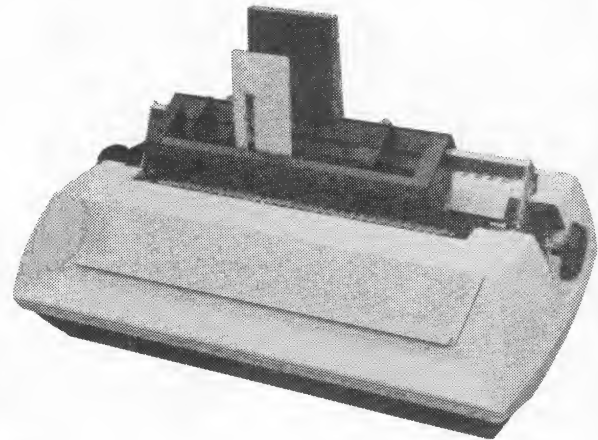
Headquarters Contact : **Nick Sackerson**

Telephone Number: **(408) 735-9904**

## Key Features

Printing Technique : **Daisy Wheel**  
Printing Speed (Characters/Second) : **55 CPS**  
Maximum Characters Per Line : **158**  
Lower Case Available : **Yes**  
Forms Feed Method : **Friction/Pin/Tractor/Feeder**  
Transmission Code : **ASCII, Correspondence**  
Internal Buffer : **Yes**  
Weight : **48 lbs.**  
Purchase Cost (Without Coupler) : **\$ 3,450**  
Monthly Cost for Service Contract : **\$ 35**  
Monthly Cost for One Year Lease (With Service) : **\$ 138**  
Monthly Cost for Three Year Lease (With Service) : **\$ 128**  
Year Introduced : **1979**  
Approximate Number Installed : **n.a.**  
Serviced By : **Direct & third party**

Model: **A-2 RECEIVE ONLY**



## General Description

The Model A-2 is designed to feel and operate like a selectric style typewriter, using the daisy wheel print mechanism for full character high quality printing. There are in excess of 50 different print styles available, which are easily changed by the operator. Ribbons are available in a multiple of colors, including multi-color ribbons.

300/1200 Baud operation with transparent mode are also standard. The A-2 will plot and super plot without modification and the commands are calcomp compatible allowing graphics to be produced 5 to 50 times faster than in the basic plot mode. There is an optional justification mode that allows for right/left margin justification, either single or dual column printing. This option includes automatic underscore, auto centering and word wrap around which allows unformatted data to be transmitted to the terminal for justification.

Included in the word processing option, is true proportional spacing, justification is done between words only). Agile corporation has optional interfaces available as follows: Burroughs, Centronics and various others. Special programming features are available.

The optional stand, can be used to store a box of paper for feeding the terminal.

Company Name : AMERICAN USED COMPUTER CO.

Headquarters Address : P. O. Box 68, Kenmore Station, Boston, MA 02215

Headquarters Contact : Herman Parco Telephone Number: (617) 261-1100

## Key Features

Printing Technique : 9 x 7 dot matrix

Printing Speed (Characters/Second) : <sup>1</sup>

Maximum Characters Per Line : 132 characters

Lower Case Available : Yes, 64 characters

Forms Feed Method : Line feed

Transmission Code : USACII

Internal Buffer : Yes, 132 characters

Weight : 118 lbs.

Purchase Cost (Without Coupler) : \$ <sup>2</sup>

Monthly Cost for Service Contract : \$ n.a.

Monthly Cost for One Year Lease (With Service) : \$ n.a.

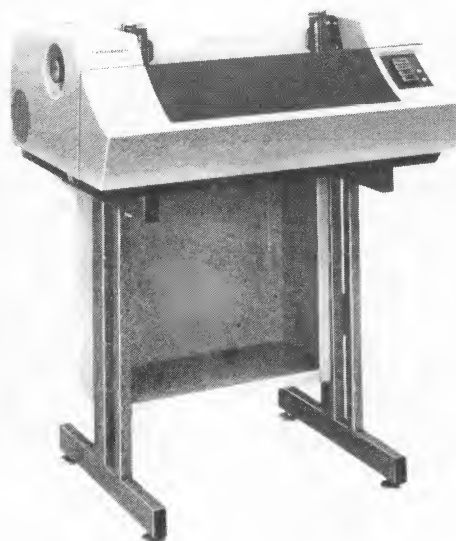
Monthly Cost for Three Year Lease (With Service) : \$ n.a.

Year Introduced : n.a.

Approximate Number Installed : n.a.

Serviced By : Centronics

Model: Centronics 101A, 102A, 103 w/RS232 interface



## General Description

The 101A is a medium speed, 165 character per second, serial, impact printer which uses dot matrix techniques for character generation. It is completely self-contained unit which includes the mechanical and electro-mechanical components, control logic, character pattern generator, single line buffer (132 characters) and power supply.

The 102A is a high speed, 330 character per second, serial, impact printer which uses a 9 x 7 dot matrix pattern for character generation. The fast 125 lpm speed of 132 characters/line is achieved with bi-directional printing. Two print heads, operating in unison, print a 132 character line with each head traveling only one-half the width of the paper.

The Model 103 is Centronics answer to the market's need for increasing the throughput of high speed serial printers. Printing efficiency has been maximized with the development of bi-directional printing and the elimination of time wasting carriage returns. The 103 is a completely self-contained unit which includes the mechanical and electromechanical components, control logic, character pattern generation, single line buffer (132 characters) and power supply.

<sup>1</sup> Printing Speed: 101A - 165 char/sec; 102A - 330 char/sec; 103 - 165 char/sec.

<sup>2</sup> Purchase Cost with RS232: 101A - \$1395; 102A - \$1895; 103 - \$1695.

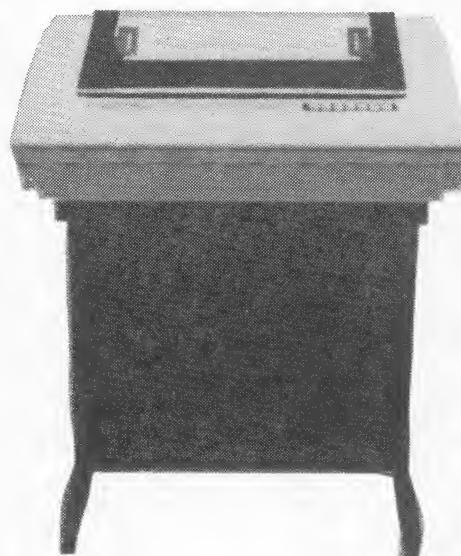
300-500-700 Printers available. Call for details.

Company Name : **DATAROYAL, INC.**  
 Headquarters Address : **235 Main Dunstable Road, Nashua, NH 03061**  
 Headquarters Contact : **Alfred J. Falco** Telephone Number: **(603) 883-4157**

## Key Features

Printing Technique : **Dot Matrix**  
 Printing Speed (Characters/Second) : **120 - 200 CPS**  
 Maximum Characters Per Line : **132**  
 Lower Case Available : **Yes**  
 Forms Feed Method : **Pin Feed**  
 Transmission Code : **Parallel or Serial**  
 Internal Buffer : **Varlous types**  
 Weight : **65 lbs.**  
 Purchase Cost (Without Coupler) : **\$ \***  
 Monthly Cost for Service Contract : **\$ 45**  
 Monthly Cost for One Year Lease (With Service) : **\$ n.a.**  
 Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**  
 Year Introduced : **1975**  
 Approximate Number Installed : **n.a.**  
 Serviced By : **Dataroyal, RCA Customers**

Model: **IPS - 7000 SERIES**



## General Description

The Dataroyal IPS - 7000 Series is a family of over 60 printer models based on a single, simple, reliable mechanism. The versatile built-in micro-computer and the high degree of modularity inherent in the IPS - 7000, allow it to be configured for a wide range of different printing styles. The IPS - 7000 Series offers several interfaces, parallel I/O plug compatible with many vendors. Serial (I/O) (EIA, CCITT, TTY and 20 MA). A selection of fonts including European and Katakana are also available.

The printer can be re-programmed to fit your requirements.

\*Purchase cost depends on model.



Company Name : DATA TERMINALS AND COMMUNICATIONS

Headquarters Address : 590 Division Street, Campbell, CA 95008

Headquarters Contact : Ron Lampe Telephone Number: (408) 378-1112

## Key Features

Printing Technique : Matrix

Printing Speed (Characters/Second) : 200

Maximum Characters Per Line : 132

Lower Case Available : Standard

Forms Feed Method : Friction

Transmission Code : ASCII

Internal Buffer : Yes

Weight : 45 lbs.

Purchase Cost (Without Coupler) : \$ 3,200

Monthly Cost for Service Contract : \$ 30

Monthly Cost for One Year Lease (With Service) : \$ 141

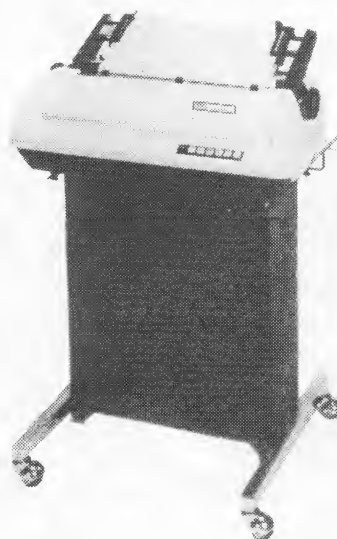
Monthly Cost for Three Year Lease (With Service) : \$ 122

Year Introduced : 1978

Approximate Number Installed : n.a.

Serviced By : DTC & Third Party

Model: DTC 200/RO



## General Description

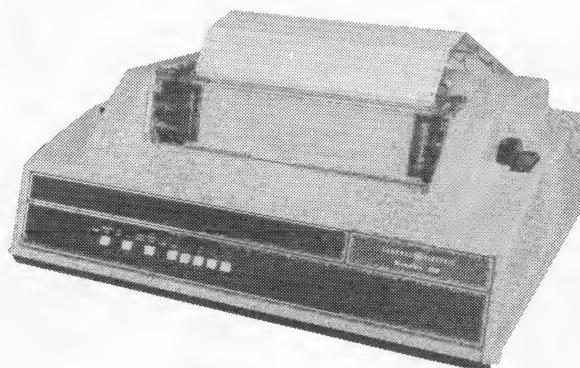
The DTC 200/RO is a compact matrix printer that utilizes a 9 wire ballistic print head which prints the 96 character ASCII set. Bi-directional printing, space to high speed slew with the 200 character per second print head combine to provide realistic thruput for printing inventory reports, program listings and manuscripts. Print sets include high resolution ASCII, APL, high resolution APL and French Canadian in the North American ROM Option or German, Norwegian, Swedish and French in the European ROM Option. Pin feed forms tractor featuring push-pull positive paper handling and pin feed platen are also optionally available as is a stand and paper tray.

Company Name : GENERAL ELECTRIC DATA COMMUNICATION PRODUCTS BUSINESS DEPT.  
 Headquarters Address : Waynesboro, VA  
 Headquarters Contact : C. F. Rockwell Telephone Number: (703) 942-8161

## Key Features

Printing Technique : Moving Head Matrix  
 Printing Speed (Characters/Second) : 120 (200 CPS Catch Up)  
 Maximum Characters Per Line : 136 - 224 selectable  
 Lower Case Available : Yes  
 Forms Feed Method : Pin Feed Tractors  
 Transmission Code : ASCII  
 Internal Buffer : Yes  
 Weight : 103 lbs  
 Purchase Cost (Without Coupler) : \$ 3,325  
 Monthly Cost for Service Contract : \$ 15  
 Monthly Cost for One Year Lease (With Service) : \$ 135\*  
 Monthly Cost for Three Year Lease (With Service) : \$ 124  
 Year Introduced : 1978  
 Approximate Number Installed : 800  
 Serviced By : General Electric

Model: TERMINET\* 200 MATRIX PRINTER



## General Description

The TermiNet\* 200 printer is a multifunctional table top unit that can be configured to satisfy a variety of data processing requirements. The unit is a self-contained table top unit, configurable as a keyboard send/receive (KSR), receive only (RO), magnetic tape send receive (MSR) or automatic send/receive (ASR) in paper tape version.

Print line is 136 characters at 10 CPI. Three other print compressions are standard within the unit allowing up to 224 characters per line. The fast print speed coupled with a 60-inch-per-second skip rate, 20-inch-per-second slow rate, 1K buffer and the 200 cps catch up make this a truly unique 1200 baud terminal. RS232C or 20/00 m. A current loop interfaces are supplied with the basic unit, data set control is optional.

\*Prices quoted includes numeric cluster and data set control.

Company Name : **HEWLETT-PACKARD COMPANY**

Headquarters Address : **P.O. Box 15, 11311 Chinden Blvd., Boise, ID 83707**

Headquarters Contact : **Bill Murphy** Telephone Number: **(208) 376-6000**

## Key Features

Printing Technique : **7 x 9 dot matrix impact**

Printing Speed (Characters/Second) : **180**

Maximum Characters Per Line : **227, 136, 68**

Lower Case Available : **Standard**

Forms Feed Method : **Tractor**

Transmission Code : **ASCII**

Internal Buffer : **229 Characters**

Weight : **51 lbs.**

Purchase Cost (Without Coupler) : **\$ 3,150**

Monthly Cost for Service Contract : **\$ 31**

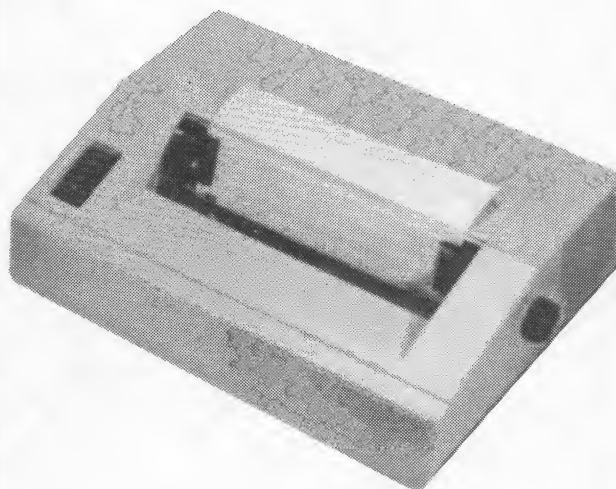
Monthly Cost for One Year Lease (With Service) : **\$ 165**

Monthly Cost for Three Year Lease (With Service) : **\$ 139**

Year Introduced : **1977**

Approximate Number Installed : **n.a.**

Serviced By : **Hewlett-Packard**

Model: **2631A**


## General Description

The HP 2631A utilizes microprocessor control to optimize throughput. A "smart printing" algorithm automatically ignores leading and trailing spaces, advances at high speed over embedded blanks and chooses the most efficient printing path (left to right or right to left) for each line.

The HP 2631A offers greatly enhanced print versatility in addition to high throughput. Compressed, normal, and expanded print modes allow line lengths of 227, 136, or 68 characters, respectively, on 14 $\frac{7}{8}$  inch wide paper. Vertical spacings of 1, 2, 3, 4, 6, 8 and 12 lines per inch provide formatting flexibility as well as allowing true subscripts, superscripts and fractions to be printed.

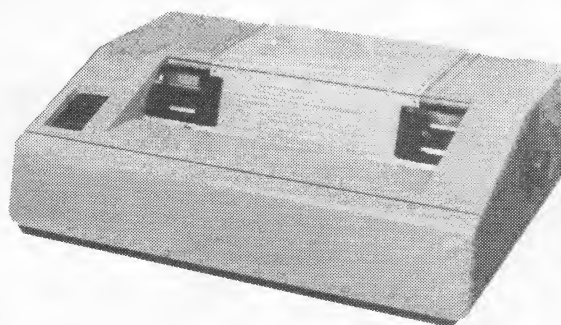
The easy loading, long-life (10-15 million characters) ribbon cartridge is typical of the features that make the HP 2631A easy to use. Additional features include self-test, display functions (allows control characters to be printed rather than executed), and two paper slots, one on the bottom and one in the back.

The standard Interface is 8-bit differential parallel. Optional interfaces include RS232C, current loop, 8-bit TTL parallel and HP-IB (IEEE 488-75).

Company Name : **HEWLETT-PACKARD COMPANY**  
 Headquarters Address : **P.O. Box 15, 11311 Chinden Blvd., Boise, ID 83707**  
 Headquarters Contact : **Bill Murphy** Telephone Number: **(208) 376-6000**

## Key Features

Printing Technique : **7 x 9 dot matrix impact**  
 Printing Speed (Characters/Second) : **180**  
 Maximum Characters Per Line : **196, 136, 98, 68**  
 Lower Case Available : **Standard**  
 Forms Feed Method : **Tractors**  
 Transmission Code : **Raster/ASCII**  
 Internal Buffer : **\***  
 Weight : **51 lbs.**  
 Purchase Cost (Without Coupler) : **\$ 4,250**  
 Monthly Cost for Service Contract : **\$ 34**  
 Monthly Cost for One Year Lease (With Service) : **\$ 223**  
 Monthly Cost for Three Year Lease (With Service) : **\$ 179**  
 Year Introduced : **1978**  
 Approximate Number Installed : **n.a.**  
 Serviced By : **Hewlett-Packard**

Model: **2631G**


## General Description

The HP 2631G produces hardcopy on standard paper from any raster format display on an HP 2647 or 2648 CRT graphics terminal. Resolution is 72 x 72 dots per inch. The hardcopy is non-fading, and multiple part paper may be used. A typical graph of 10 inches by 5 inches, from the screen of a CRT, can be printed in less than 60 seconds.

The HP 2631G Graphics Printer also shares all the alphanumeric capabilities of the HP 2631A printer, upon which it is based. These capabilities include 180 cps print speed and microprocessor-optimized, bi-directional printing. Four print sizes (14.4, 10, 7.2 and 5 characters per inch) and seven line spacings (1, 2, 3, 4, 6, 8 and 12 lines per inch) are program selectable. In addition, page length and text length can be independently set via program control.

There are several optional foreign languages available including European languages, math symbols, Cyrillic and Katakana. Up to four languages may be resident in the 2631G and be selected via program control. A special high density character set is also available for applications requiring higher-quality print.

The 2631G comes with an HP-IB (IEEE 488-1975) interface.

\*One 229 character alphanumeric buffer; two 976 byte graphics input buffers.

Company Name : HONEYWELL INFORMATION SYSTEM, INC.

Headquarters Address : 200 Smith Street, Waltham, MA 02154

Headquarters Contact : Chuck Haase (MS# 405) Telephone Number: (617) 890-8400

## Key Features

Printing Technique : Impact Dot Matrix

Printing Speed (Characters/Second) : 30, 120 CPS

Maximum Characters Per Line : 132

Lower Case Available : Yes

Forms Feed Method : Tractor Feed

Transmission Code : USASCII

Internal Buffer : Yes, 64 or 1000 char.

Weight : 64 lbs.

Purchase Cost (Without Coupler) : \$ 2300 to 3400

Monthly Cost for Service Contract : \$ 25 to 45

Monthly Cost for One Year Lease (With Service) : \$ n.a.

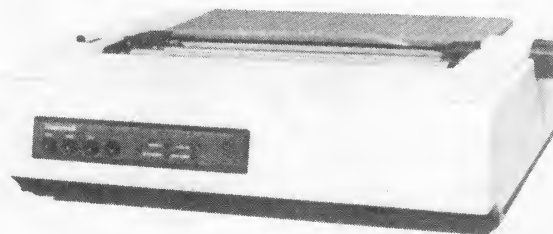
Monthly Cost for Three Year Lease (With Service) : \$ 105 to 160

Year Introduced : 1978

Approximate Number Installed :

Serviced By : Honeywell Information Systems, Inc.

Model: PRU1001,1002,1003,1005 Receive only Terminals



## General Description

The PRU1001 is a 30 cps serial printer terminal with an asynchronous transmission rate of 300 bits per second (bps) and an internal buffer of 64 characters. The PRU1002 is 120 cps with a transmission rate of 1200 bps and an internal buffer of 64 characters.

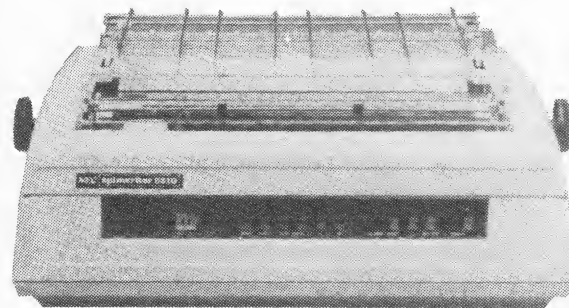
The PRU1003 is a 30 cps serial printer terminal with horizontal and vertical tab setting capability, an internal buffer of 64 characters, and selectable transmission rates of 110, 200 and 300 bps. The PRU 1005 is 120 cps with horizontal and vertical tab setting, an internal buffer of 1000 characters and a transmission rate of 1200 bps.

### OPTIONS:

- Paper stacker (TTF0020) - Attaches to rear of printer and collects fan fold paper output.
- Pedestal (TTF0200) - Table high with paper stacker.
- Vertical Format Unit (TTF0210) - Automatically controls vertical form positioning; vertical tabulation and head of form (avail. with PRU1003 and PRU1005).
- Print Position Indicator (TTF0211) - A three digit electronic display, mounted on the operator panel, which indicates next column to be printed in (avail. with PRU1003 and PRU1005).
- 20 MA Current Loop Interface (TTF0212) - Allows direct connection to a host at distances up to 1000 feet.
- 60 Key Keyboard (PKU0111) - Can be field installed on all models.

**Company Name** : **NEC INFORMATION SYSTEMS, INC.****Headquarters Address** : **5 Militia Drive, Lexington, MA 02173****Headquarters Contact** : **Jack Flynn/Bruce Thatcher****Telephone Number:** **(617) 862-3120****Key Features**

**Printing Technique** : **Impact, Print "Thimble"**  
**Printing Speed (Characters/Second)** : **55 CPS**  
**Maximum Characters Per Line** : **136 (10 pitch)**  
**Lower Case Available** : **Yes**  
**Forms Feed Method** : **Friction/Tractor/Pin Feed**  
**Transmission Code** : **RS 232C (ANSI)**  
**Internal Buffer** : **256 Characters**  
**Weight** : **45.5 lbs.**  
**Purchase Cost (Without Coupler)** : **\$ 2,775**  
**Monthly Cost for Service Contract** : **\$ 32**  
**Monthly Cost for One Year Lease (With Service)** : **\$ n.a.**  
**Monthly Cost for Three Year Lease (With Service)** : **\$ n.a.**  
**Year Introduced** : **1977**  
**Approximate Number Installed** : **n.a.**  
**Serviced By** : **NEC Information Systems  
Dow Jones Service Co.**

**Model:** **5510 RO "SPINWRITER" TERMINAL****General Description**

**GENERAL** - NEC Information Systems' Model 5510 Receive Only SPINWRITER Terminal is a micro processor controlled serial, impact terminal designed for remote printing applications where impeccable print quality is required. The SPINWRITER terminals print up to 55 characters per second while receiving data at rates up to 120 characters per second via the RS-232C/CCITT V.24 interface. The unique print element, called a print thimble, contains up to 128 fully formed characters. If the number of characters is limited to 125, a space is left so that the last characters printed are fully visible to the operator.

**PRINT THIMBLE** - The SPINWRITER's unique small-diameter, low-mass print element is a low-cost, long-life, fiberglass reinforced plastic "thimble" that is produced by arranging cylindrically and molding 64 individual, spring action fingers on which two characters are mounted, one above the other. Normal print element life is more than 30 million impressions. Various fonts are available.

**COMMUNICATION CAPABILITY** - The SPINWRITER can be interfaced to a data communication network through a Bell 103-type modem (or equivalent). It communicates in either half or full duplex at data rates of 110, 150, 200, 300, 600, or 1200 Baud. Received characters are stored in a 256 character communication line buffer while keyboard generated characters pass through a 16 character buffer.

**OPERATING NOISE LEVEL** - The SPINWRITER is quiet - only 60 dB with the standard die-cast aluminum cover installed, 67 dB (Maximum) with cover removed. The low operating noise level allows the SPINWRITER to be used in an office environment.



Company Name : **NEC INFORMATION SYSTEMS, INC.**

Headquarters Address : **5 Millita Drive, Lexington, MA 02173**

Headquarters Contact : **Jack Flynn/Bruce Thatcher**

Telephone Number: **(617) 862-3120**

## Key Features

Printing Technique : **Impact, Print "Thimble"**

Printing Speed (Characters/Second) : **55 CPS**

Maximum Characters Per Line : **136 (10 pltch)**

Lower Case Available : **Yes**

Forms Feed Method : **Friction/Tractor/Pin Feed**

Transmission Code : **RS 232C (Diablo)**

Internal Buffer : **256 Characters**

Weight : **45.5 lbs.**

Purchase Cost (Without Coupler) : **\$ 2,850**

Monthly Cost for Service Contract : **\$ 32**

Monthly Cost for One Year Lease (With Service) : **\$ n.a.**

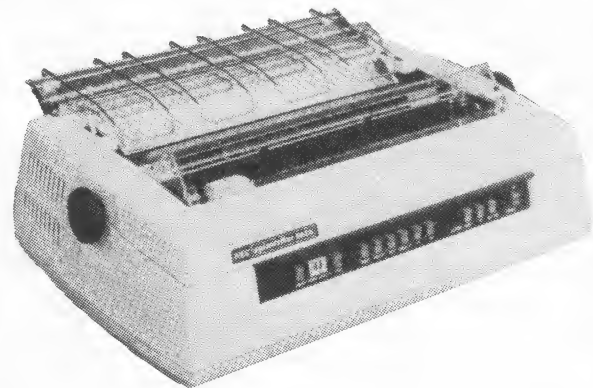
Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**

Year Introduced : **1977**

Approximate Number Installed : **n.a.**

Serviced By : **NEC Information Systems  
Dow Jones Service Co.**

Model: **5515 RO "SPINWRITER" TERMINAL**



## General Description

**GENERAL** - NEC Information Systems' new Model 5515 Receive Only SPINWRITER Terminal is a micro processor controlled serial, impact terminal designed for remote printing applications where impeccable print quality is required. The SPINWRITER Terminals print up to 55 characters per second while receiving data at rates up to 120 characters per second via the RS-232C/CCITT V.24 Interface. The unique print element, called a print thimble, contains up to 128 fully formed characters. If the number of characters is limited to 125, a space is left so that the last characters printed are fully visible to the operator. The Model 5510 duplicates precisely the escape code sequences employed in Diablo 1610 and Xerox 1710 RO Terminals.

**PRINT THIMBLE** - The SPINWRITER's unique small-diameter, low-mass print element is a low-cost, long-life, fiberglass reinforced plastic "thimble" that is produced by arranging cylindrically and molding 64 individual, spring action fingers on which two characters are mounted, one above the other. Normal print element life is more than 30 million impressions. Various fonts are available.

**COMMUNICATION CAPABILITY** - The SPINWRITER can be interfaced to a data communication network through a Bell 103-type modem (or equivalent). It communicates in either half or full duplex at data rates of 100, 150, 200, 300, 600, or 1200 Baud. Received characters are stored in a 256 character communication line buffer while keyboard generated characters pass through a 16 character buffer. Three switch selectable communications protocols are standard ETX/ACK, X-ON/X-OFF (DC1/DC3), and Reverse Channel (active high or low).

**OPERATING NOISE LEVEL** - The SPINWRITER is quiet - only 60 dB with the standard die-cast aluminum cover installed, 67 dB (Maximum) with cover removed. The low operating noise level allows the SPINWRITER to be used in an office environment.

Date: **July, 1979**

Submitted By: **Bruce E. Frost, Application Manager**

Company Name : PERKIN-ELMER TERMINALS DIVISION

Headquarters Address : Route 10 &amp; Emery Avenue, Randolph, NJ

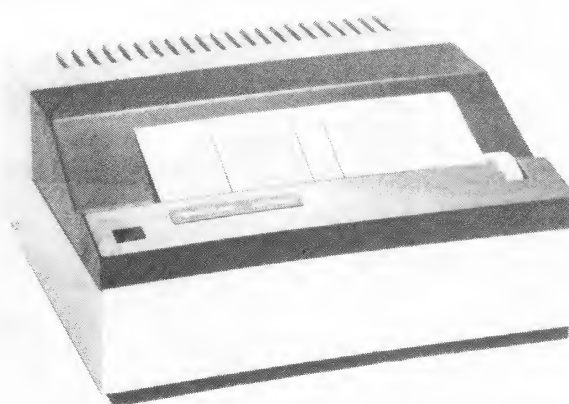
Headquarters Contact : Lloyd N. Pearson, III

Telephone Number: (201) 366-5550

## Key Features

Model: 650

Printing Technique	: Thermal
Printing Speed (Characters/Second)	: 100 cps
Maximum Characters Per Line	: 24
Lower Case Available	: Yes, standard
Forms Feed Method	: Friction
Transmission Code	: RS232
Internal Buffer	: Yes, 1920 characters <sup>1</sup>
Weight	: 15 lbs
Purchase Cost (Without Coupler)	: \$ 782 <sup>2</sup>
Monthly Cost for Service Contract	: \$ n.a.
Monthly Cost for One Year Lease (With Service)	: \$ n.a.
Monthly Cost for Three Year Lease (With Service)	: \$ n.a.
Year Introduced	: 1977
Approximate Number Installed	: 3000
Serviced By	: Perkin-Elmer Sales & Service Division



## General Description

The Model 650 CRT Page Printer produces a full 1920 character (24 x 80) CRT screen in less than 20 seconds on a piece of 8½ x 11 thermal paper at 300 cps. Its combination of 9600 baud maximum data transfer rate and full screen buffer allows it to free the CRT from all other functions after only two seconds. Thermal printing occurs at approximately 100 characters/second, entirely independent of the CRT. The character set consists of all 94 printable ASC 11 characters, upper and lower case, presented in a 9 x 12 dot matrix for maximum readability. Perkin-Elmer provides warranty-safe thermal paper in convenient long lasting 300 foot rolls.

A unique thermal printing design utilizes stationary heads and only one moving part, the platen and associated drive motor, for near-silent operation and high reliability.

The interface is serial RS232C/CCITT-V24, with switchable baud rates of 300, 600, 1200, 2400, 4800, and 9600. A standard 25-pin RS232C male connector is mounted on the rear of the unit.

<sup>1</sup>Optional second page buffer available.

<sup>2</sup>Quantity 100.

Company Name : POTTER INSTRUMENT COMPANY, INC.

Headquarters Address : 45 Executive Drive, Plainview, NY 11803

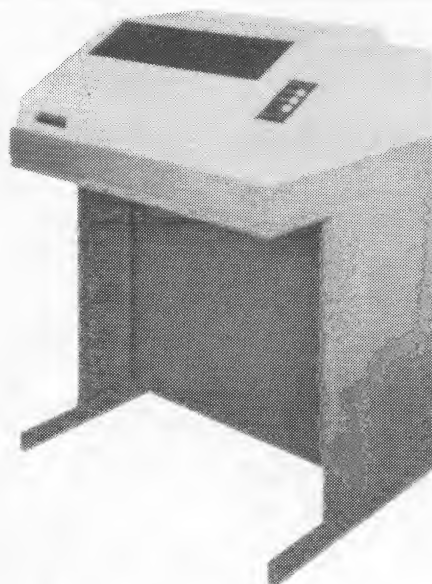
Headquarters Contact : Dennis S. Boland

Telephone Number: (516) 681-3200

## Key Features

Printing Technique : Matrix  
 Printing Speed (Characters/Second) : 300, 400, 500, 600 LPM  
 Maximum Characters Per Line : 132  
 Lower Case Available : Yes  
 Forms Feed Method : Pin, tractor feed  
 Transmission Code : ASCII code RS-232C  
 Internal Buffer : Yes  
 Weight : 365 lbs. (165 Kg)  
 Purchase Cost (Without Coupler) : \$ \*  
 Monthly Cost for Service Contract : \$ 75  
 Monthly Cost for One Year Lease (With Service) : \$ n.a.  
 Monthly Cost for Three Year Lease (With Service) : \$ n.a.  
 Year Introduced : 1978  
 Approximate Number Installed : Over 50  
 Serviced By : OEM Manufacturer

Model: LP6303, 6304, 6305, 6306



## General Description

The LP6303 Printer Line is a family of dot matrix printers with speeds at 300, 400, 500 and 600 lines per minute. These printers are rugged enough for factory use, reliable enough for a Data Processing environment, quiet enough for office use and print 6-part copy. The dots of the matrix are produced at the intersection of a vertical and horizontal ridge. The vertical ridge is the thread of a lead screw or helix while the horizontal ridge is the thin blade of the hammer. As the lead screw or helix turns, the ridge moves across the blade of the hammer. At the desired time the hammer is energized, the paper is compressed and a dot is made. As the helix sweeps by, an entire row of dots can be printed. The paper is then advanced by a stepper motor and the process repeated until the entire character is generated. To get the printing speed, there are 22 hammers each of which has its own helix. The microprocessor electronics keeps track of the sweep and controls all printing functions. The printing programs and character sets are contained in programmable memories providing the flexibility of modern electronics.

\*Purchase Cost: \$4,950 (300 LPM); \$7,000 (600 LPM).

Company Name : PRINTRONIX, INC.

Headquarters Address : 17421 Derian Ave., P.O. Box 19559, Irvine, CA 92713

Headquarters Contact : Peter M. Craig Telephone Number: (714) 549-8272

## Key Features

Printing Technique : Impact Raster Matrix

Printing Speed (Characters/Second) : 150/300/600 1pm

Maximum Characters Per Line : 132

Lower Case Available : Yes

Forms Feed Method : 8 pin tractor

Transmission Code : ASCII/EBCDIC

Internal Buffer : Yes, 132 characters

Weight : 185 lbs.

Purchase Cost (Without Coupler) : \$ <sup>1</sup>

Monthly Cost for Service Contract : \$ 85

Monthly Cost for One Year Lease (With Service) : \$ <sup>2</sup>

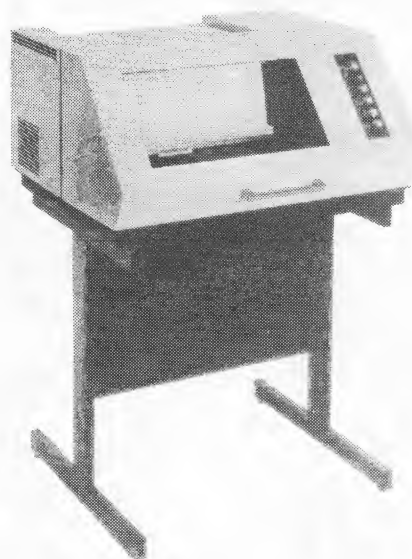
Monthly Cost for Three Year Lease (With Service) : \$ <sup>2</sup>

Year Introduced : 1974

Approximate Number Installed : 9,000

Serviced By : PRINTRONIX, INC.

Model: P/600, P/300, P/150



## General Description

Printronix models P150/P300/P600 are fully buffered line printers suitable for direct connection to minicomputers or for remote printing. Local connection is either parallel or serial; remote connection is 2780/3780 BSC compatible.

<sup>1</sup> Purchase Cost (Without Coupler): P150 - \$4,880; P300 - \$5,980; P600 - \$8,180

<sup>2</sup> Contact local distributor



**TERMINALS  
DIRECTORY**

# PRINTERS

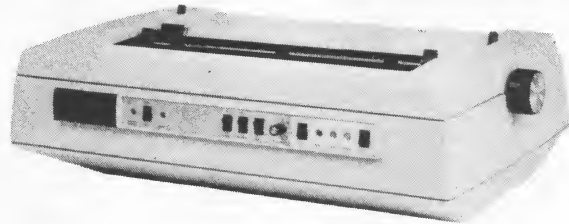
XIV.260

Company Name : QUME CORPORATION  
Headquarters Address : 2323 Industrial Parkway West, Hayward, CA 94545  
Headquarters Contact : Lee Cannon Telephone Number: (415) 783-6100

## Key Features

Printing Technique : Daisy wheel  
Printing Speed (Characters/Second) : 45 & 55 cps  
Maximum Characters Per Line : 132, 158 or as defined  
Lower Case Available : Yes  
Forms Feed Method : Friction, Pin, Tractor  
Transmission Code : ASCII  
Internal Buffer : Yes, 224 characters  
Weight : 44 lbs.  
Purchase Cost (Without Coupler) : \$ 2900  
Monthly Cost for Service Contract : \$ 31  
Monthly Cost for One Year Lease (With Service) : \$ n.a.  
Monthly Cost for Three Year Lease (With Service) : \$ n.a.  
Year Introduced : 1977  
Approximate Number Installed : n.a.  
Serviced By : Sorbus in major cities

Model: QUME S5/45, S5/55



## General Description

A microprocessor-controlled daisywheel printer specifically designed for integration into data processing systems. Available as an RO Printer, the Sprint 5 provides high quality, high speed daisywheel printing. Important features include:

- Over 50 different type styles including APL, Scientific Symbols and international character sets
- Smart microprocessor utilization for powerful flexibility
- 43 Qume-defined commands for operator control
- Convenient switch selectable functions on front panel
- Built-in diagnostics
- Serial or parallel Interface

Date: July, 1979

Submitted By: Lee Cannon, Product Manager - Sprint 5



Company Name : **RACAL-MILGO INFORMATION SYSTEMS, INC.**

Headquarters Address : **8600 N.W. 41 Street, Miami, FL 33166**

Headquarters Contact : **John Denhardt** Telephone Number: **(305) 592-8600**

**Key Features**

Printing Technique : **Dot Matrix**

Printing Speed (Characters/Second) : **200 LPM**

Maximum Characters Per Line : **132**

Lower Case Available : **64 characters USASCII**

Forms Feed Method : **Pin Feed Front**

Transmission Code :

Internal Buffer :

Weight : **110 lbs.**

Purchase Cost (Without Coupler) : **\$ 5,460**

Monthly Cost for Service Contract : **\$ \***

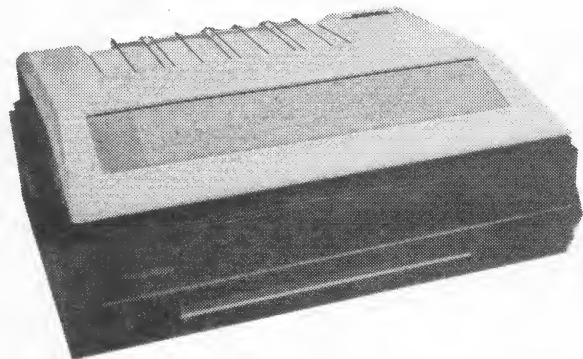
Monthly Cost for One Year Lease (With Service) : **\$ 200**

Monthly Cost for Three Year Lease (With Service) : **\$ 149**

Year Introduced : **1978**

Approximate Number Installed : **20**

Serviced By : **RACAL-MILGO, INC.**

Model: **TP403****General Description****ADDITIONAL SPECIFICATIONS**

Character Style	Dot Matrix, 5 x 7
Character Size	.062" x .096"
Line Spacing	6 lines per inch or optional 6/8 lines per inch switch selectable
Character Spacing	10 characters per inch
Print Registration	Horizontal .004" char. to char.; Vertical + .003" char. to char.
Paper Feed Mechanisms	Standard business machine pin-feed with adjustable width tractors
Paper Advance Speed	24 lines per second
Forms	Type - Continuous fanfold, edge perforated; Width - Variable from 4 to 14 7/8"
Copies	Up to six
Forms Control	2 channel tape loop vertical format unit
Paper Out Detection	Audible alarm occurs one inch from bottom of form
Inking System	Type - Reusable fabric ribbon (3/4 inch x 40 yards) reel to reel
Power	600 watts
Line Voltages & frequencies	100/117/220 VAC + 10%, 60 Hz + 2%
Dimensions	28" (71.1 cm) wide by 24.5" (62.2 cm) deep by 11" (27.9 cm) high. Height on stand 39.5" (100.3 cm)

Specifications are subject to change without notice.

\*based on number of units and location.

Date: **July, 1979**Submitted By: **Jim Tedrick, Product Manager**

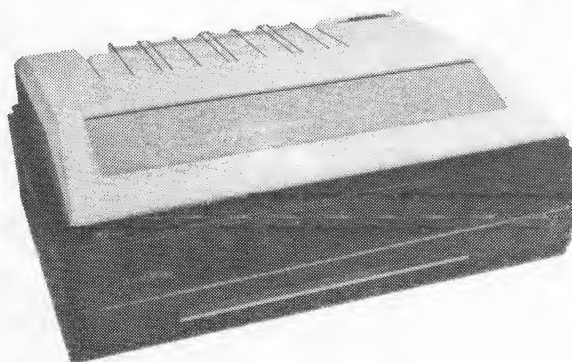


Company Name : RACAL-MILGO INFORMATION SYSTEMS, INC.  
 Headquarters Address : 8600 N.W. 41 Street, Miami, FL 33166  
 Headquarters Contact : John Denhardt Telephone Number: (305) 592-8600

## Key Features

Model: TP404

Printing Technique : Dot Matrix  
 Printing Speed (Characters/Second) : 160 CPS  
 Maximum Characters Per Line : 132  
 Lower Case Available : 64 characters USASCII  
 Forms Feed Method : Pin Feed  
 Transmission Code : ASCII  
 Internal Buffer :  
 Weight : 110 lbs.  
 Purchase Cost (Without Coupler) : \$ 4,250  
 Monthly Cost for Service Contract : \$ \*  
 Monthly Cost for One Year Lease (With Service) : \$ 160  
 Monthly Cost for Three Year Lease (With Service) : \$ 118  
 Year Introduced : 1978  
 Approximate Number Installed : 50  
 Serviced By : RACAL-MILGO, INC.



## General Description

### ADDITIONAL SPECIFICATIONS

Character Style	Dot Matrix 5 x 7
Character Size	.062" x .097"
Line Spacing	6 lines per inch or optional 6/8 lines per inch switch selectable
Character Spacing	10 characters per inch
Print Registration	Horizontal .004" char. to char.; Vertical + .003" char. to char.
Paper Feed Mechanisms	Standard business machine pin-feed with adjustable width tractors
Paper Advance Speed	24 lines per second
Forms	Type-Continuous fanfold, edge perforated; Width-Variable from 4 to 14 7/8"
Copies	Up to six
Forms of Control	2 channel tape loop vertical format unit
Paper Out Detection	Audible alarm occurs one inch from bottom of form
Inking System	Type-Reusable fabric ribbon (3/4 inch x 40 yards) reel to reel
Power	600 watts
Line Voltage and frequencies	110/117/220 VAC + 10%, 60 Hz + 2%
Dimensions	28" (71.1 cm) wide by 24.5" (62.2 cm) deep by 11" (27.9 cm) high. Height on stand 39.5" (100.3 cm)

Specifications are subject to change without notice.  
 \*based on location and number of units.

Date: July, 1979

Submitted By: Jim Tedrick, Product Manager

Company Name : **TEKTRONIX**  
 Headquarters Address : **P. O. Box 500, Beaverton, OR 97077**  
 Headquarters Contact : **John Kadel** Telephone Number: **(503) 682-3411**

## Key Features

Printing Technique : **Impact**  
 Printing Speed (Characters/Second) : **60 CPS**  
 Maximum Characters Per Line : **80/132**  
 Lower Case Available : **Yes**  
 Forms Feed Method : **Uses linefeed**  
 Transmission Code : **n.a.**  
 Internal Buffer : **One line**  
 Weight : **45 lbs.**  
 Purchase Cost (Without Coupler) : **\$ 2250**  
 Monthly Cost for Service Contract : **\$ 42**  
 Monthly Cost for One Year Lease (With Service) : **\$ 135**  
 Monthly Cost for Three Year Lease (With Service) : **\$ 90**  
 Year Introduced : **1977**  
 Approximate Number Installed : **n.a.**  
 Serviced By : **Tektronix**

Model: **TEKTRONIX 4642**



## General Description

The 4642 is a tabletop, 80 column, impact printer designed for use with the Tektronix 4024, 4025, and 4051. The standard printer also allows 132 column output by the selection of a condensed character set. Standard paper feed is by friction and uses inexpensive roll paper. Tractor feed is available as an option. The printer has 96 standard ASCII characters and an RS232-C interface.

**GRAPHICS TERMINALS**

Data Terminals & Communications	
DTC 382 .....	XV.020
Florida Data Corporation	
BNY .....	XV.040
Heath Data Systems	
WH19 .....	XV.060
NEC Information Systems, Inc.	
5520 KSR .....	XV.080
5525 KSR .....	XV.081
5540 APL .....	XV.082
Sanders Associates, Inc.	
GRAPHIC 7, MODEL 5710 .....	XV.100
Tektronix	
4006-1 .....	XV.120
4014-1 .....	XV.121
4016-1 .....	XV.122
4025 .....	XV.123
4027 .....	XV.124



Company Name : DATA TERMINALS & COMMUNICATIONS

Headquarters Address : 590 Division St., Campbell, CA 95008

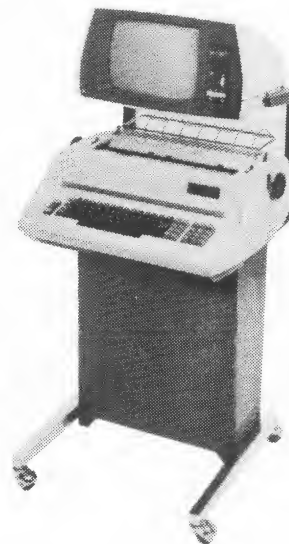
Headquarters Contact : R. E. Lampe

Telephone Number: (408) 378-1112

**Key Features**

Printing Technique : Impact  
Maximum Page Size : 14"  
Multiple Color Capability : Red/Black  
Forms Feed Method : Dual Cam Pin Feed  
Transmission Rate : 30 cps  
Transmission Code : ASC II  
Internal Buffer : 256 Characters  
Weight : 47 lbs. (21.3 kg.)  
Purchase Cost (Without Coupler) : \$ 3,850  
Monthly Cost for Service Contract : \$ 30  
Monthly Cost for One Year Lease (With Service) : \$ 155  
Monthly Cost for Three Year Lease (With Service) : \$ 137  
Year Introduced : 1977  
Approximate Number Installed : 700  
Serviced By : Authorized third parties

Model: DTC 382

**General Description**

The DTC-382 Data Terminal has two plot modes. The fundamental plot mode is driven by LF, SP, BS and RLF codes in addition to using any character for plotting. The super plot mode utilizes a quadrature and vector system of plotting where a digit sets the quadrant for the plot direction, single or double value move and pen up or pen down. The plot character gives X and Y vector motion according to its value. A series of characters can be used to draw two dimensional figures. Plot resolution up to 5760 points per square inch.

Company Name : **FLORIDA DATA CORPORATION**

Headquarters Address : **3308 West New Haven Ave., West Melbourne, FL 32901**

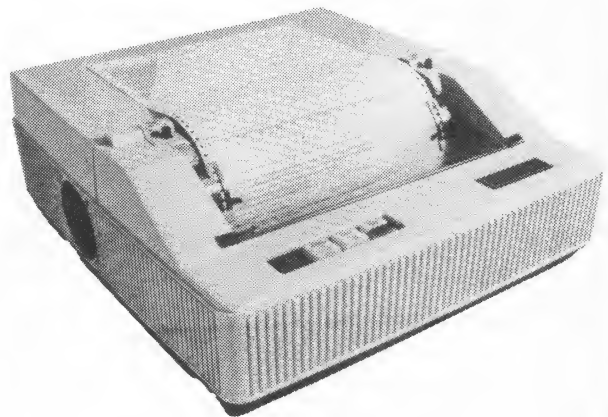
Headquarters Contact : **Marketing**

Telephone Number: **(305) 724-6088**

## Key Features

Printing Technique : **dot matrix**  
 Maximum Page Size : **13.2" x any length**  
 Multiple Color Capability :  
 Forms Feed Method : **pin feed continuous form**  
 Transmission Rate : **9600 baud**  
 Transmission Code : **1**  
 Internal Buffer : **270K dots or 13 lines**  
 Weight : **80 lbs.**  
 Purchase Cost (Without Coupler) : **\$ 5500**  
 Monthly Cost for Service Contract : **\$**  
 Monthly Cost for One Year Lease (With Service) : **\$**  
 Monthly Cost for Three Year Lease (With Service) : **\$**  
 Year Introduced : **1979**  
 Approximate Number Installed : **over 50**  
 Serviced By :

Model: **BNY**



## General Description

The BNY is a special purpose graphics plotter and line printer. The graphics mode will plot a symmetrical 128 dots per inch, both horizontal and vertical. The unit will operate as a line printer at 600 characters per second or average 400 LPM multicopy output. Up to four character sets can be stored in the printer under program control.

<sup>1</sup> Transmission Code: dot addressable and character generator

Date: **September, 1979**

Submitted By: **J. W. Adkisson, President**



Company Name : HEATH DATA SYSTEMS

Headquarters Address : Benton Harbor, MI 49022

Headquarters Contact : Larry Plummer

Telephone Number: (616) 982-3200

### Key Features

Printing Technique : 12" Raster scan dot-Matrix  
Maximum Page Size : 25 x 80  
Multiple Color Capability :  
Forms Feed Method :  
Transmission Rate : 110-9600 baud (std. rates)  
Transmission Code : ASC II  
Internal Buffer :  
Weight : 45 lbs.  
Purchase Cost (Without Coupler) : \$ 995.00  
Monthly Cost for Service Contract : \$  
Monthly Cost for One Year Lease (With Service) : \$  
Monthly Cost for Three Year Lease (With Service) : \$  
Year Introduced : 1979  
Approximate Number Installed : 2800  
Served By :

Model: WH19



### General Description

- Z80 Controller
- DEC VT52 compatible
- ANSI std. Esc codes and Heath Esc also
- Reverse video on a per character basis
- 33 Graphics characters
- Keyboard programmable baud rates
- Numeric Key pad

<sup>1</sup>Served By: Heathkit Electronic Centers, Canadian Heathkit Electronic Centers, International sales, Factory mail order, Retail computer stores.





Company Name : NEC INFORMATION SYSTEMS, INC.

Headquarters Address : 5 Militia Drive, Lexington, MA 02173

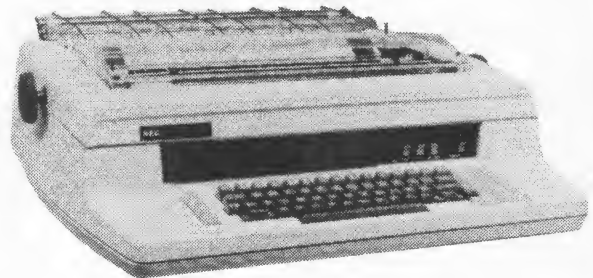
Headquarters Contact : Jack Flynn/Bruce Thatcher

Telephone Number: (617) 862-3120

**Key Features**

Printing Technique : Impact, Print "Thimble"  
Maximum Page Size : 16 inches wide  
Multiple Color Capability : Yes  
Forms Feed Method : 1  
Transmission Rate : 110, 300, 1200 STD  
Transmission Code : ASCII  
Internal Buffer : 256 Characters  
Weight : 51.0 lbs.  
Purchase Cost (Without Coupler) : \$ 3,090  
Monthly Cost for Service Contract : \$ 32.00  
Monthly Cost for One Year Lease (With Service) : \$ n.a.  
Monthly Cost for Three Year Lease (With Service) : \$ n.a.  
Year Introduced : 1977  
Approximate Number Installed : Not Available  
Serviced By : NEC Information Systems  
Dow Jones Service Co.

Model: 5520 KSR SPINWRITER Terminal

**General Description**

**GENERAL** — NEC Information Systems' new Model 5510 Receive Only and Model 5520 Keyboard Send/Receive SPINWRITER Terminals are microprocessor controlled serial, impact terminals designed for remote printing applications where impeccable print quality is required. The SPINWRITER terminals print up to 55 characters per second while receiving data at rates up to 120 characters per second via the RS-232C/CCITT V.24 interface. The unique print element, called a print thimble, contains up to 128 fully formed characters. If the number of characters is limited to 125, a space is left so that the last characters printed are fully visible to the operator.

**PRINT THIMBLE** — The SPINWRITER's unique small-diameter, low-mass print element is a low-cost, long-life, fiberglass reinforced plastic "thimble" that is produced by arranging cylindrically and molding 64 individual, spring action fingers on which two characters are mounted, one above the other. Normal print element life is more than 30 million impressions. Various fonts are available.

**COMMUNICATION CAPABILITY** — The SPINWRITER can be interfaced to a data communication network through a Bell 103-type modem (or equivalent). It communicates in either half or full duplex at data rates of 110, 300, or 1200 Baud (optional rates are 150, 200, and 600. Received characters are stored in a 256 character communication line buffer while keyboard generated characters pass through a 16 character buffer.

**OPERATING NOISE LEVEL** — The SPINWRITER is quiet, only 60 dB with the standard die-cast aluminum cover installed, 67 dB (Maximum) with cover removed. The low operating noise level allows a SPINWRITER to be used in an office environment.

<sup>1</sup> Friction/Tractor/Pin Feed. Front Inserter cut sheet feeder.



Company Name : NEC INFORMATION SYSTEMS, INC.

Headquarters Address : 5 Militia Drive, Lexington, MA 02173

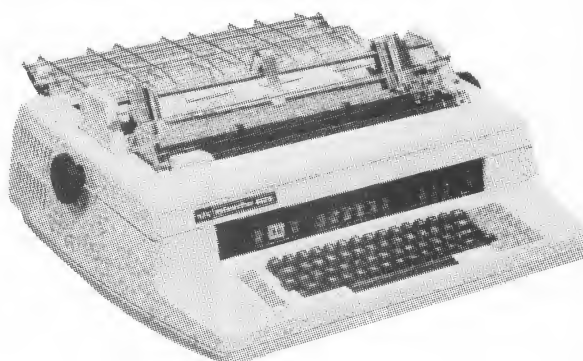
Headquarters Contact : Jack Flynn/Bruce Thatcher

Telephone Number: (617) 862-3120

**Key Features**

Printing Technique : Impact, Print "Thimble"  
Maximum Page Size : 55 CPS  
Multiple Color Capability : Yes  
Forms Feed Method : 1  
Transmission Rate : 110, 300, 1200 STD  
Transmission Code : ASCII  
Internal Buffer : 256 Characters  
Weight : 51.0 lbs.  
Purchase Cost (Without Coupler) : \$ 3,170  
Monthly Cost for Service Contract : \$ 32.00  
Monthly Cost for One Year Lease (With Service) : \$ n.a.  
Monthly Cost for Three Year Lease (With Service) : \$ n.a.  
Year Introduced : 1978  
Approximate Number Installed : Not Available  
Served By : NEC Information Systems  
Dow Jones Service Co.

Model: 5525 KSR SPINWRITER Terminal

**General Description**

**GENERAL** — NEC Information Systems' new Model 5515 Receive Only and Model 5525 KSR SPINWRITER Terminals are micro processor controlled serial, impact terminals designed for remote printing applications where impeccable print quality is required. The SPINWRITER Terminals print up to 55 characters per second while receiving data at rates up to 120 characters per second via the RS-232C/CCITT V.24 interface. The unique print element called a print thimble, contains up to 128 fully formed characters. If the number of characters is limited to 125, a space is left so that the last characters printed are fully visible to the operator. The Models 5515 and 5525 duplicate precisely the escape code sequences employed in Diablo 1610/1620 and Xerox 1710 RO and 1700 KSR Terminals.

**PRINT THIMBLE** — The SPINWRITER's unique small-diameter, low-mass print element is a low cost, long-life, fiberglass reinforced plastic "thimble" that is produced by arranging cylindrically and molding 64 individual, spring action fingers on which two characters are mounted, one above the other. Normal print element life is more than 30 million impressions. Various fonts are available.

**COMMUNICATION CAPABILITY** — The SPINWRITER can be interfaced to a data communication network through a Bell 103-type modem (or equivalent). It communicates in either half or full duplex at data rates of 110, 150, 200, 300, 600, or 1200 Baud. Received characters are stored in a 256 character communication line buffer while keyboard generated characters pass through a 16 character buffer. Three switch selectable communications protocols are standard ETX/ACK, X-ON/X-OFF (DC1/DC3), and Reverse Channel (active high or low), ENQ/ACK Protocol is optional.

<sup>1</sup> Friction/Tractor/Pin Feed. Cut Sheet Feeder.

Company Name : **NEC INFORMATION SYSTEMS, INC.**

Headquarters Address : **5 Militia Drive, Lexington, MA 02173**

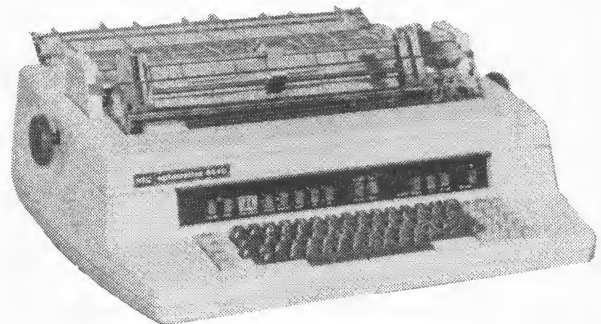
Headquarters Contact : **Jack Flynn/Bruce Thatcher**

Telephone Number: **(617) 862-3120**

## Key Features

Printing Technique : **Impact, Print "Thimble"**  
Maximum Page Size : **55 CPS**  
Multiple Color Capability : **Yes**  
Forms Feed Method : **1**  
Transmission Rate : **110, 300, 1200 STD**  
Transmission Code : **ASCII**  
Internal Buffer : **256 Characters**  
Weight : **51.0 lbs.**  
Purchase Cost (Without Coupler) : **\$ 3,300**  
Monthly Cost for Service Contract : **\$ 32.00**  
Monthly Cost for One Year Lease (With Service) : **\$ n.a.**  
Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**  
Year Introduced : **1979**  
Approximate Number Installed : **Not Available**  
Served By : **NEC Information Systems  
Dow Jones Service Co.**

Model: **5540 APL SPINWRITER Terminal**



## General Description

**GENERAL** — NEC Information Systems' new Model 5540 APL SPINWRITER Terminal is a microprocessor controlled serial, impact terminal designed for remote printing applications. The SPINWRITER Terminals print up to 55 characters per second while receiving data at rates up to 120 characters per second via the RS-232C/CCITT V.24 interface. The unique print element, contains up to 128 fully formed characters, and thus enables printing of the upper and lower case alpha characters, numerics, and full set of APL symbols without changing print elements. **PRINT THIMBLE** — The SPINWRITER's unique small-diameter, low-mass print element is a low cost, long-life, fiberglass reinforced plastic "thimble" that is produced by arranging cylindrically and molding 64 individual, spring action fingers on which two characters are mounted, one above the other. Normal print element life is more than 30 million impressions. Various fonts are available.

**COMMUNICATION CAPABILITY** — The SPINWRITER can be interfaced to a data communication network through a Bell 103-type modem (or equivalent). It communicates in either half or full duplex at data rates of 110, 150, 200, 300, 600, or 1200 Baud. Received characters are stored in a 256 character communication line buffer while keyboard generated characters pass through a 16 character buffer. Three switch selectable communications protocols are standard ETX/ACK, X-ON/X-OFF (DC1/DC3), and Reverse Channel (active high or low).

**OPERATING NOISE LEVEL** — The SPINWRITER is quiet, only 60 dB with the standard die cast aluminum cover installed, 67 dB (maximum) with cover removed. The low operating noise level allows the SPINWRITER to be used in an office environment.

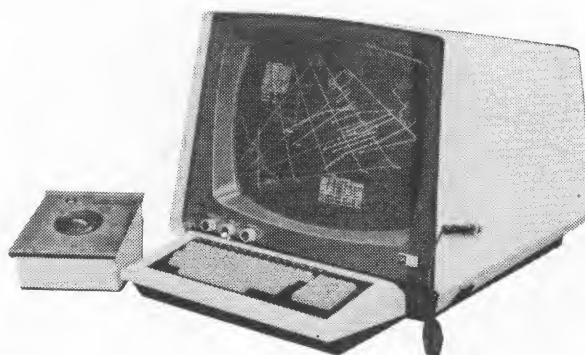
<sup>1</sup> Friction/Tractor/Pin Feed. Cut Sheet Feeder.

Company Name : **SANDERS ASSOCIATES, INC.**  
 Headquarters Address : **D. W. Highway South, Nashua, NH 03061**  
 Headquarters Contact : **Marketing Dept., Information Products Division** Telephone Number: **(603) 885-5280**

## Key Features

Printing Technique : **CRT**  
 Maximum Page Size : **21" Diagonal**  
 Multiple Color Capability : **No (on this model)**  
 Forms Feed Method : **n.a.**  
 Transmission Rate : **9600 baud**  
 Transmission Code : **ASCII**  
 Internal Buffer : **8K**  
 Weight : **159 lbs.**  
 Purchase Cost (Without Coupler) : **\$ 35,100**  
 Monthly Cost for Service Contract : **\$ n.a.**  
 Monthly Cost for One Year Lease (With Service) : **\$ n.a.**  
 Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**  
 Year Introduced : **1976**  
 Approximate Number Installed : **200**  
 Serviced By : **Sanders Associates**

Model: **SANDERS GRAPHIC 7, MODEL 5710**



## General Description

The Graphic 7 is completely preprogrammed and ready to interface to any computer equipped with a standard communications or I/O port. The system's terminal controller includes two microprocessors, up to 128K bytes of read-write memory, up to 16K bytes of read-only memory for firmware, analog function generators, serial and parallel interface.

The display microprocessor is contained on a single printed circuit card. It has the architecture of a full 16 bit minicomputer, with over 400 instructions, eight addressing modes, priority level interrupts, and unique trap vectors for each peripheral device. The display microprocessor controls system initialization, interface handling, local data editing, and refresh functions.

A special microprocessor that retrieves, interprets, and acts on display instructions from the refresh memory for generation of the image on the screen. Like the display microprocessor, the graphic controller is housed in the terminal controller.



Company Name : **TEKTRONIX, INC.**

Headquarters Address : **P. O. Box 500, Beaverton, OR 97077**

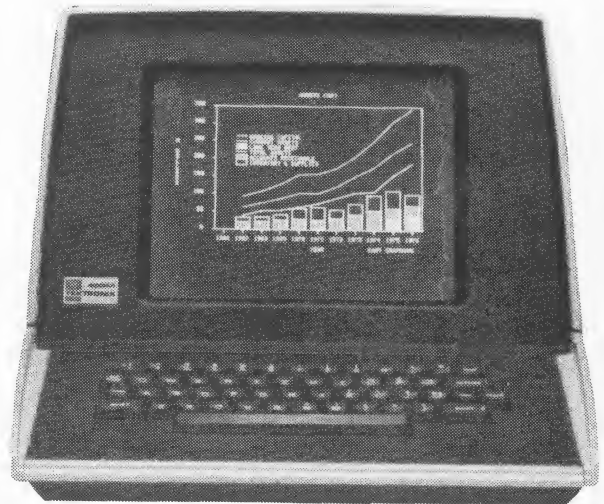
Headquarters Contact : **Melissa Waggener**

Telephone Number: **(503) 682-3411**

**Key Features**

Printing Technique : **CRT**  
Maximum Page Size : **7.5" x 5.6"**  
Multiple Color Capability : **No**  
Forms Feed Method : **n.a.**  
Transmission Rate : **75-4800 Baud**  
Transmission Code : **TTY ANSI**  
Internal Buffer : **No**  
Weight : **42 lbs**  
Purchase Cost (Without Coupler) : **\$ 2,995**  
Monthly Cost for Service Contract : **\$ 38**  
Monthly Cost for One Year Lease (With Service) : **\$ 180**  
Monthly Cost for Three Year Lease (With Service) : **\$ 120**  
Year Introduced : **1976**  
Approximate Number Installed :  
Serviced By : **Tektronix**

Model: **Tektronix 4006-1**



**General Description**

The 4006-1 is a low cost, desk-top graphics terminal. Connects readily to most mainframes through the RS-232-C interface. Display medium is direct-view bistable storage tube, which produces sharp, flicker-free images. The 11 inch screen provides up to 1024 x 780Y viewable points. Compatible with the Tektronix 4631 hard copy unit, the 4923 digital tape recorder and 4662 interactive digital plotter.

Company Name : **TEKTRONIX, INC.**

Headquarters Address : **P. O. Box 500, Beaverton, OR 97077**

Headquarters Contact : **Melissa Waggener**

Telephone Number: **(503) 682-3411**

## Key Features

Printing Technique : **CRT**  
 Maximum Page Size : **15" x 11"**  
 Multiple Color Capability : **No**  
 Forms Feed Method : **n.a.**  
 Transmission Rate : **75-9600 Baud**  
 Transmission Code : **Full ASCII**  
 Internal Buffer : **Yes**  
 Weight : **150 lbs**  
 Purchase Cost (Without Coupler) : **\$ 12,195**  
 Monthly Cost for Service Contract : **\$ 80/102**  
 Monthly Cost for One Year Lease (With Service) : **\$ 733**  
 Monthly Cost for Three Year Lease (With Service) : **\$ 488**  
 Year Introduced : **1973**  
 Approximate Number Installed :  
 Serviced By : **Tektronix**

Model: **Tektronix 4014-1**



## General Description

The 4014-1 is a 19 inch, high resolution graphics terminal. Uses direct-view bistable storage tube display, for sharp, non-flickering images. Over 12 million displayable points. Optional plug-in intelligence provides programmable keyboard capability, local symbol design, scaling, clipping and rotation. Hard copy and plotter compatibility.





Company Name : TEKTRONIX, INC.

Headquarters Address : P. O. Box 500, Beaverton, OR 97077

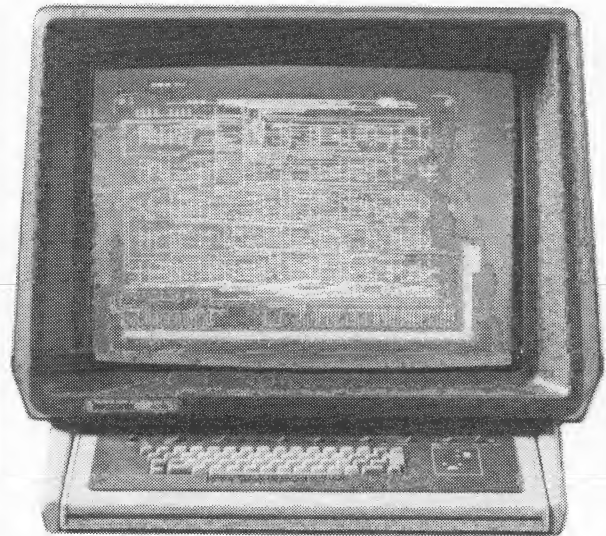
Headquarters Contact : Melissa Waggener

Telephone Number: (503) 682-3411

**Key Features**

Printing Technique : CRT  
Maximum Page Size : 18" x 13.5"  
Multiple Color Capability : No  
Forms Feed Method : n.a.  
Transmission Rate : 75-9600 Baud  
Transmission Code : Full ASCII  
Internal Buffer : Yes  
Weight : 250 lbs  
Purchase Cost (Without Coupler) : \$ 19,500  
Monthly Cost for Service Contract : \$ 100/160  
Monthly Cost for One Year Lease (With Service) : \$ 1,170  
Monthly Cost for Three Year Lease (With Service) : \$ 780  
Year Introduced : 1978  
Approximate Number Installed :  
Serviced By : Tektronix

Model: Tektronix 4016-1

**General Description**

The 4016-1 is a 25 inch high resolution graphics terminal. Uses DVST display technology for flicker-free images. Over 15,000 displayable characters. Complete 4014-1 compatibility. Optional plug-in intelligence provides up to 28K of usable graphics display memory, relative graphics, scaling, rotation, programmable keyboard and other features. Detachable keyboard. Hard copy and plotter compatibility.



Company Name : **TEKTRONIX, INC.**

Headquarters Address : **P. O. Box 500, Beaverton, OR 97077**

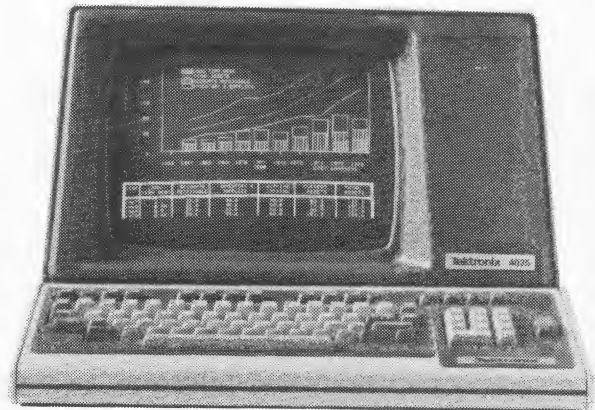
Headquarters Contact : **Melissa Waggener**

Telephone Number: **(503) 682-3411**

**Key Features**

Printing Technique : **CRT**  
Maximum Page Size : **8.5" x 4.5"**  
Multiple Color Capability : **No**  
Forms Feed Method : **n.a.**  
Transmission Rate : **75-9600 Baud**  
Transmission Code : **Full ASCII**  
Internal Buffer : **Yes**  
Weight : **60 lbs**  
Purchase Cost (Without Coupler) : **\$ 3,595**  
Monthly Cost for Service Contract : **\$ 21/29**  
Monthly Cost for One Year Lease (With Service) : **\$ 189**  
Monthly Cost for Three Year Lease (With Service) : **\$ 143**  
Year Introduced : **1978**  
Approximate Number Installed :  
Serviced By : **Tektronix**

Model: **Tektronix 4025**



**General Description**

The 4025 is a 12 inch raster scan graphics terminal. Can be used for optional forms ruling applications as well as graphics. Predefined editing keys. User definable keyboard. Standard 4K memory expandable to 32K and provides buffering and scrolling capability. Split screen display, each with independent scrolling of graphics or alphanumerics.

Company Name : **TEKTRONIX, INC.**

Headquarters Address : **P. O. Box 500, Beaverton, OR 97077**

Headquarters Contact : **Melissa Waggener**

Telephone Number: **(503) 682-3411**

## Key Features

Printing Technique : **CRT**

Maximum Page Size : **8.5" x 4.5"**

Multiple Color Capability : **Yes**

Forms Feed Method : **n.a.**

Transmission Rate : **Up to 9600 Baud**

Transmission Code : **Full ASCII**

Internal Buffer : **Yes**

Weight : **100 lbs**

Purchase Cost (Without Coupler) : **\$ 8,695**

Monthly Cost for Service Contract : **\$ 82**

Monthly Cost for One Year Lease (With Service) : **\$ 522**

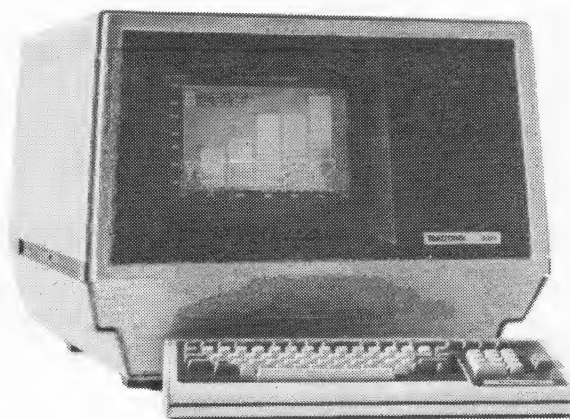
Monthly Cost for Three Year Lease (With Service) : **\$ 348**

Year Introduced : **1978**

Approximate Number Installed :

Serviced By : **Tektronix**

Model: **Tektronix 4027**



## General Description

The new Tektronix 4027 Color Graphics Terminal is a high performance, raster scan display terminal. Like the 4025, its capabilities include scrolling graphics and alphanumerics and multipaged graphing, plus color.

Colors can be selected from a 64 color palette with up to eight colors simultaneously on the screen. Firmware controls color vectors, characters and symbols and fills polygons. When filling polygons, the firmware allows the user to select any of 120 different user-definable patterns or color combinations. Gray-scale hard copy compatible and color plotter compatible.



**REMOTE BATCH TERMINALS**

NEC Information Systems, Inc.

5520 KSR .....	XVI.020
5525 KSR .....	XVI.021
5540 APL .....	XVI.022

Company Name : NEC INFORMATION SYSTEMS, INC.

Headquarters Address : 5 Militia Drive, Lexington, MA 02173

Headquarters Contact : Jack Flynn/Bruce Thatcher

Telephone Number: (617) 862-3120

## Key Features

Input Media : Keyboard

Maximum Input Speed (Char/Sec) : 120 CPS

Output Media : Print Out

Maximum Output Speed (Char/Sec) : 55 CPS

Transmission Rate : 110, 300, 1200 STD

Transmission Code : ASCII

Internal Buffer : 256 Characters

Weight : 51 lbs.

Purchase Cost : \$ 3,090

Monthly Cost for Service Contract : \$ 32

Monthly Cost for One Year Lease (With Service) : \$ n.a.

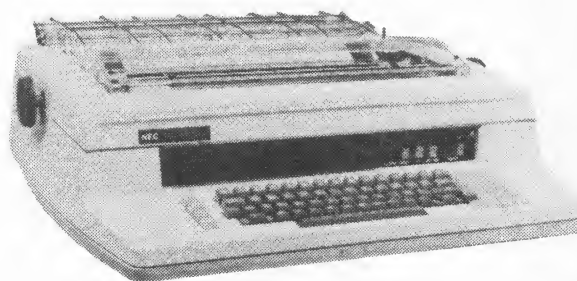
Monthly Cost for Three Year Lease (With Service) : \$ n.a.

Year Introduced : 1977

Approximate Number Installed : n.a.

Serviced By : NEC Information Systems  
Dow Jones Service Co.

Model: 5520 KSR SPINWRITER TERMINAL



## General Description

**GENERAL** — NEC Information Systems' new Model 5510 Receive Only and Model 5520 Keyboard Send/Receive SPINWRITER Terminals are microprocessor controlled serial, impact terminals designed for remote printing applications where impeccable print quality is required. The SPINWRITER Terminals print up to 55 characters per second while receiving data at rates up to 120 characters per second via the RS-232C/CCITT V.24 interface. The unique print element, called a print thimble, contains up to 128 fully formed characters. If the number of characters is limited to 125, a space is left so that the last characters printed are fully visible to the operator.

**PRINT THIMBLE** — The SPINWRITER's unique small-diameter, low-mass print element is a low-cost, long-life, fiberglass reinforced plastic "thimble" that is produced by arranging cylindrically and molding 64 individual, spring action fingers on which two characters are mounted, one above the other. Normal print element life is more than 30 million impressions. Various fonts are available.

**COMMUNICATION CAPABILITY** — The SPINWRITER can be interfaced to a data communication network through a Bell 103-type modem (or equivalent). It communicates in either half or full duplex at data rates of 110, 300, or 1200 Baud (optional rates are 150, 200, and 600). Received characters are stored in a 256 character communication line buffer while keyboard generated characters pass through a 16 character buffer. EXT/ACK, DC1/DC3 (XON/XOFF), and Reverse Channel Line Protocols are switch selectable.

**OPERATING NOISE LEVEL** — The SPINWRITER is quiet — only 60 dB with the standard die-cast aluminum cover installed, 67 dB (maximum) with cover removed. The low operating noise level allows the SPINWRITER to be used in an office environment.

Company Name : NEC INFORMATION SYSTEMS, INC.

Headquarters Address : 5 Militia Drive, Lexington, MA 02173

Headquarters Contact : Jack Flynn/Bruce Thatcher

Telephone Number: (617) 862-3120

## Key Features

Input Media : Keyboard

Maximum Input Speed (Char/Sec) : 120 CPS

Output Media : Print Out

Maximum Output Speed (Char/Sec) : 55 CPS

Transmission Rate : 110, 300, 1200 STD

Transmission Code : ASCII

Internal Buffer : 256 Characters

Weight : 51 lbs.

Purchase Cost : \$ 3,170

Monthly Cost for Service Contract : \$ 32

Monthly Cost for One Year Lease (With Service) : \$ n.a.

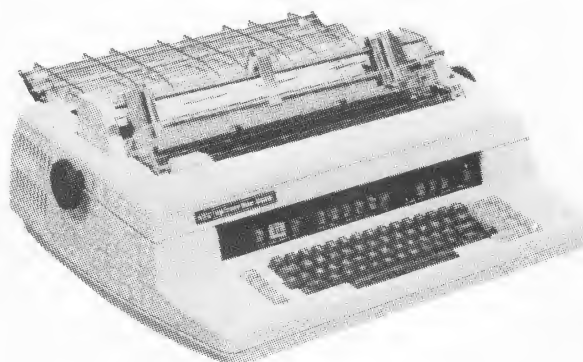
Monthly Cost for Three Year Lease (With Service) : \$ n.a.

Year Introduced : 1978

Approximate Number Installed : n.a.

Serviced By : NEC Information Systems  
Dow Jones Service Co.

Model: 5525 KSR SPINWRITER TERMINAL



## General Description

**GENERAL** — NEC Information Systems' new Model 5515 Receive Only and Model 5525 KSR SPINWRITER Terminals are micro processor controlled serial, impact terminals designed for remote printing applications where impeccable print quality is required. The SPINWRITER Terminals print up to 55 characters per second while receiving data at rates up to 120 characters per second via the RS-232C/CCITT V.24 interface. The unique print element called a print thimble, contains up to 128 fully formed characters. If the number of characters is limited to 125, a space is left so that the last characters printed are fully visible to the operator. The Models 5515 and 5525 duplicate precisely the escape code sequences employed in Diablo 1610/1620 and Xerox 1710 RO and 1700 KSR Terminals.

**PRINT THIMBLE** — The SPINWRITER's unique small-diameter, low-mass print element is a low cost, long-life, fiberglass reinforced plastic "thimble" that is produced by arranging cylindrically and molding 64 individual, spring action fingers on which two characters are mounted, one above the other. Normal print element life is more than 30 million impressions. Various fonts are available.

**COMMUNICATION CAPABILITY** — The SPINWRITER can be interfaced to a data communication network through a Bell 103-type modem (or equivalent). It communicates in either half or full duplex at data rates of 110, 150, 200, 300, 600, or 1200 Baud. Received characters are stored in a 256 character communication line buffer while keyboard generated characters pass through a 16 character buffer. Three switch selectable communications protocols are standard ETX/ACK, X-ON/X-OFF (DC1/DC3), and Reverse Channel (active high or low), ENQ/ACK Protocol is optional.



Company Name : **NEC INFORMATION SYSTEMS, INC.**

Headquarters Address : **5 Militia Drive, Lexington, MA 02173**

Headquarters Contact : **Jack Flynn/Bruce Thatcher**

Telephone Number: **(617) 862-3120**

## Key Features

Input Media : **Keyboard**

Maximum Input Speed (Char/Sec) : **120 CPS**

Output Media : **Print Out**

Maximum Output Speed (Char/Sec) : **55 CPS**

Transmission Rate : **110, 300, 1200 STD**

Transmission Code : **ASCII**

Internal Buffer : **256 Characters**

Weight : **51 lbs.**

Purchase Cost : **\$ 3,300**

Monthly Cost for Service Contract : **\$ 32**

Monthly Cost for One Year Lease (With Service) : **\$ n.a.**

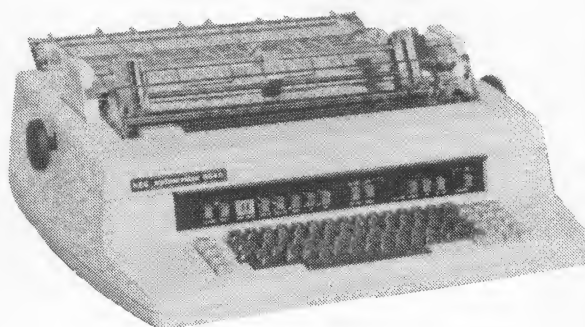
Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**

Year Introduced : **1979**

Approximate Number Installed : **n.a.**

Serviced By : **NEC Information Systems  
Dow Jones Service Co.**

Model: **5540 APL SPINWRITER TERMINAL**



## General Description

**GENERAL** — NEC Information Systems' new Model 5540 APL SPINWRITER Terminal is a microprocessor controlled serial, impact terminal designed for remote printing applications. The SPINWRITER Terminals print up to 55 characters per second while receiving data at rates up to 120 characters per second via the RS-232C/CCITT V.24 interface. The unique print element, contains up to 128 fully formed characters, and thus enables printing of the upper and lower case alpha characters, numerics, and a full set of APL symbols without changing print elements.

**PRINT THIMBLE** — The SPINWRITER's unique small-diameter, low-mass print element is a low cost, long-life, fiberglass reinforced plastic "thimble" that is produced by arranging cylindrically and molding 64 individual, spring action fingers on which two characters are mounted, one above the other. Normal print element life is more than 30 million impressions. Various fonts are available.

**COMMUNICATION CAPABILITY** — The SPINWRITER can be interfaced to a data communication network through a Bell 103-type modem (or equivalent). It communicates in either half or full duplex at data rates of 110, 150, 200, 300, 600, or 1200 Baud. Received characters are stored in a 256 character communication line buffer while keyboard generated characters pass through a 16 character buffer. Three switch selectable communications protocols are standard ETX/ACK, X-ON/X-OFF (DC1/DC3), and Reverse Channel (active high or low).

**OPERATING NOISE LEVEL** — The SPINWRITER is quiet — only 60 dB with the standard die cast aluminum cover installed, 67 dB (maximum) with cover removed. The low operating noise level allows the SPINWRITER to be used in an office environment.



INTELLIGENT TERMINALS

Digital Equipment Corporation	
PDT 11/150 SERIES .....	XVII.020
PDT 11/130 .....	XVII.021
PDT 11/110 .....	XVII.022
Manufacturing Data Systems, Inc.	
ST-1 .....	XVII.040
Megadata Corporation	
SIR-1000/RM	
SWS 2001 .....	XVII.061
SYSTEM 700 .....	XVII.062
NCR Corporation	
NCR-C-7510 .....	XVII.080
NCR C-7530 .....	XVII.081
Ramtek Corporation	
6110 .....	XVII.100
6200A .....	XVII.101
6310 .....	XVII.102
Texas Instruments Incorporated	
742 .....	XVII.120
770 .....	XVII.121
771 .....	XVII.122



Company Name : **DIGITAL EQUIPMENT CORPORATION**

Headquarters Address : **146 Main Street, Maynard, MA 01754**

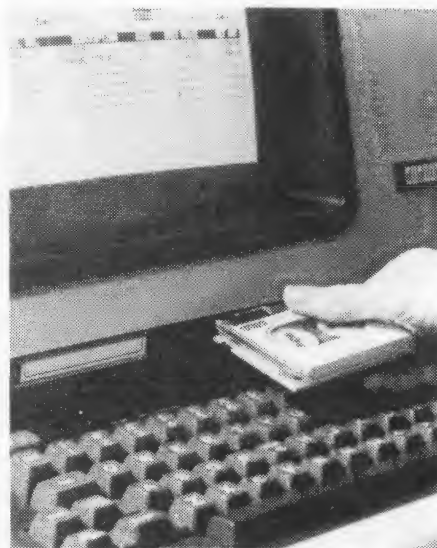
Headquarters Contact : **Charles Perrell**

Telephone Number: **(617) 481-7400**

**Key Features**

Screen Size (Diagonal) : **12" Diag**  
Maximum Characters Per Line : **132**  
Maximum Lines on Screen : **24**  
Lower Case Available : **Yes**  
Transmission Speed (char./sec.) : **5 - 1920**  
Transmission Code : **ASCII**  
Internal Buffer : **16KB - 60KB**  
Weight :  
Purchase Cost (Without Coupler) : **\$ 5000 list**  
Monthly Cost for Service Contract : **\$ 55 approx.**  
Monthly Cost for One Year Lease (With Service) : **\$ n.a.**  
Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**  
Year Introduced : **1978**  
Approximate Number Installed : **n.a.**  
Serviced By : **Digital**

Model: **PDT 11/130**

**General Description**

**PDT-11/130 - The PDT-11/130 system is an entry-level, user-programmable, intelligent terminal with local mass storage. It combines the functionality of the VT100 video terminal and PDP-11 processor with up to 60K bytes of random access memory, asynchronous and synchronous host communication port, and dual minicartridge tapes with 512K bytes of mass storage, all housed within the same package. Specifications are those of the basic VT100.**

**The dual minicartridge tapes are file-structured system devices so that data can be quickly read and written. System files and data files can be stored locally, and captured data can also be stored for later transmission.**

**FEATURES:**

- **PDP-11 compatible instruction set**
- **Up to 60K bytes of 16-bit RAM**
- **512K bytes dual minicartridges**
- **Single-package configuration**
- **Self-test diagnostics**

Company Name : **DIGITAL EQUIPMENT CORPORATION**

 Headquarters Address : **146 Main Street, Maynard, MA 01754**

 Headquarters Contact : **Charles Perrell**

 Telephone Number: **(617) 481-7400**

## Key Features

Screen Size (Diagonal)	:	<b>12" Diag</b>
Maximum Characters Per Line	:	<b>132</b>
Maximum Lines on Screen	:	<b>24</b>
Lower Case Available	:	<b>Yes</b>
Transmission Speed (char. sec.)	:	<b>5 - 1920</b>
Transmission Code	:	<b>ASCII</b>
Internal Buffer	:	<b>16KB - 60KB</b>
Weight	:	
Purchase Cost (Without Coupler)	:	<b>\$ 3900 list</b>
Monthly Cost for Service Contract	:	<b>\$ 40 approx.</b>
Monthly Cost for One Year Lease (With Service)	:	<b>\$ n.a.</b>
Monthly Cost for Three Year Lease (With Service)	:	<b>\$ n.a.</b>
Year Introduced	:	<b>1978</b>
Approximate Number Installed	:	<b>n.a.</b>
Serviced By	:	<b>Digital</b>

 Model: **PDT 11/110**


## General Description

**PDT-11/110** - The PDT-11/110 terminal is a downline or ROM loadable, user-programmable intelligent terminal. It provides all of the VT100 functionality, the power of a PDP-11 compatible microcomputer, varying increments of memory, and asynchronous or synchronous communication port.

### FEATURES:

- PDP-11 code compatibility
- Up to 60K bytes of RAM
- Asynchronous/synchronous host communication port
- EIA port for local printer
- Clusters up to three additional workstations
- Automatic program load
- Self-test diagnostics

Company Name : **MANUFACTURING DATA SYSTEMS, INC.**

Headquarters Address : **4251 Plymouth Road, Ann Arbor, MI 48105**

Headquarters Contact : **Richard J. Paull, Corp. Product Specialist** Telephone Number: **(313) 995-6000**

**Key Features**

Printing Technique/Screen Size : **Hard copy impact printer**

Maximum Characters Per Line : **132**

Maximum Page Size : **11x13"**

Lower Case Available : **Yes**

Transmission Speed (char./sec.) : **30 cps**

Transmission Code :

Internal Buffer : **253 characters**

Weight : **200 #**

Purchase Cost (Without Coupler) : \$ \*

Monthly Cost for Service Contract : \$ \*

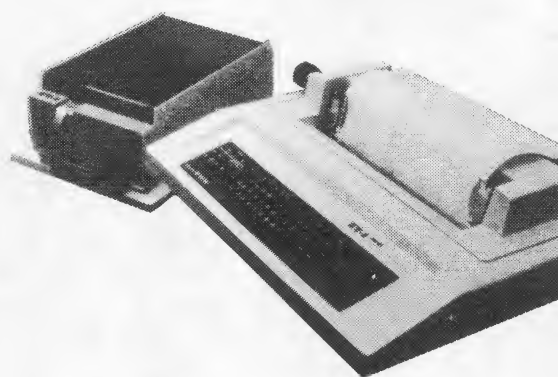
Monthly Cost for One Year Lease (With Service) : \$ \*

Monthly Cost for Three Year Lease (With Service) : \$ \*

Year Introduced : **September, 1976**

Approximate Number Installed : **400**

Serviced By : **Carterfone**  
\*Available on request.

Model: **ST-1 tape preparation center**

**General Description**

MDSI®'s ST-1 tape preparation center provides a convenient and cost-effective method of creating, editing and duplicating NC tapes. The ST-1 eliminates the need for conventional tape punching equipment, but, more than that, applies microprocessor technology to increase NC productivity and reduce overall costs through fast, accurate and economical preparation of NC tapes.



Company Name : **NCR CORPORATION**

Headquarters Address : **1700 S. Patterson Blvd., Dayton, OH 45479**

Headquarters Contact : **D. G. Richardson** Telephone Number: **(513)449-6623**

**Key Features**

Printing Technique/Screen Size : **9" <sup>1</sup>**

Maximum Characters Per Line : **32**

Maximum Page Size : **16**

Lower Case Available : **Yes**

Transmission Speed (char./sec.) : **2400/4800 BPS**

Transmission Code : **ASCII or EBCDIC**

Internal Buffer : **Yes**

Weight : **60 lbs (approx.)**

Purchase Cost (Without Coupler) : **\$ 5,575**

Monthly Cost for Service Contract : **\$ 429**

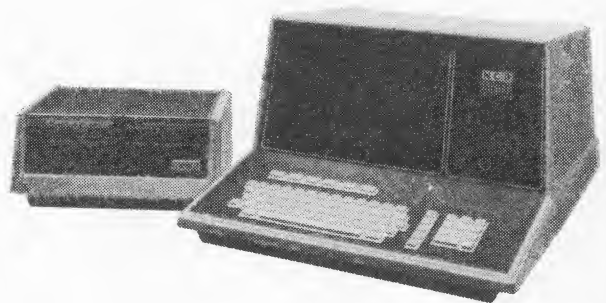
Monthly Cost for One Year Lease (With Service) : **\$ 191**

Monthly Cost for Three Year Lease (With Service) : **\$ 179**

Year Introduced : **June, 1978**

Approximate Number Installed : **n.a.**

Serviced By : **NCR Corporation**

Model: **NCR C-7510****General Description**

The NCR C-7510 Data Entry system's modular design provides the ability to configure hardware, firmware/software and features to suit specific user needs.

**HARDWARE**

- 9" CRT (standard)
- Single ANSI Compatible Cassette
- Any one of four keyboard styles

**FEATURES**

- Multi-record blocking (up to 512 characters)
- Verify under format control
- Error Messages
- Formattable Data Entry Parameters:
  - Must Enter
  - By Pass
  - Zero or Space Fill
  - Field Length
  - Block Length
  - Record or Not Record Field Separators
  - Must Fill
  - Left or Right Justification
  - Auto or Manual Skip/Dup
  - Record Length
  - Data Type

**FIRMWARE/SOFTWARE**

- Data Entry Firmware (user formattable)
- 512 bytes of format storage memory
- Search on Record Number or Mask
- Error Correction by Char., Field, Record

<sup>1</sup> 12" Screen optional with 80 characters per line and 25 lines on the screen.





Company Name : **NCR CORPORATION**

Headquarters Address : **1700 S. Patterson Blvd., Dayton, OH 45479**

Headquarters Contact : **D. G. Richardson**

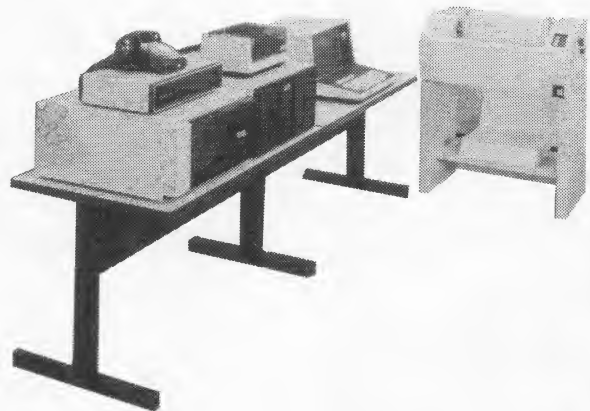
Telephone Number: **(513)449-6623**

-3750

**Key Features**

Printing Technique/Screen Size : **9" Std. <sup>1</sup>**  
Maximum Characters Per Line : **32**  
Maximum Page Size : **16**  
Lower Case Available : **Yes**  
Transmission Speed (char./sec.) : **2400 BPS**  
Transmission Code : **ASCII or EBCDIC**  
Internal Buffer : **Yes**  
Weight : **130-200 lbs (approx.)**  
Purchase Cost (Without Coupler) : **\$ 14640**  
Monthly Cost for Service Contract : **\$ 952**  
Monthly Cost for One Year Lease (With Service) : **\$ 482**  
Monthly Cost for Three Year Lease (With Service) : **\$ 455**  
Year Introduced : **June, 1978**  
Approximate Number Installed : **n.a.**  
Serviced By : **NCR Corporation**

Model: **NCR C-7530**



**General Description**

The NCR C-7530 is one of the most flexible Media Conversion systems available. The following Media Conversion capabilities exist:

- **Cassette to/from Second Cassette (selective copy)**
- **Cassette to/from Flexible Disk (single or dual - simultaneously)**
- **Flexible Disk to/from Cassette (single or dual - simultaneously)**
- **Flexible Disk to/from Second Flexible Disk (selective copy)**
- **Cassette to/from 1/2" Magnetic Tape**
- **Flexible Disk to/from 1/2" Magnetic Tape**
- **Cassette - to - the second cassette and/or dual flexible disk and/or magnetic tape and/or to the printer - simultaneously**
- **Flexible Disk - to - the second flexible disks and or dual cassettes and/or magnetic tape and to the printer - simultaneously**
- **Magnetic Tape - to - dual cassettes, dual flexible disks, and to the printer - simultaneously**

<sup>1</sup> 12" Screen optional with 80 characters per line and 25 lines on the screen.

Date: **November, 1978**

Submitted By: **D. G. Richardson, 7500 Product Manager**



Company Name : **RAMTEK CORPORATION**

Headquarters Address : **585 No. Mary Ave., Sunnyvale, CA 94086**

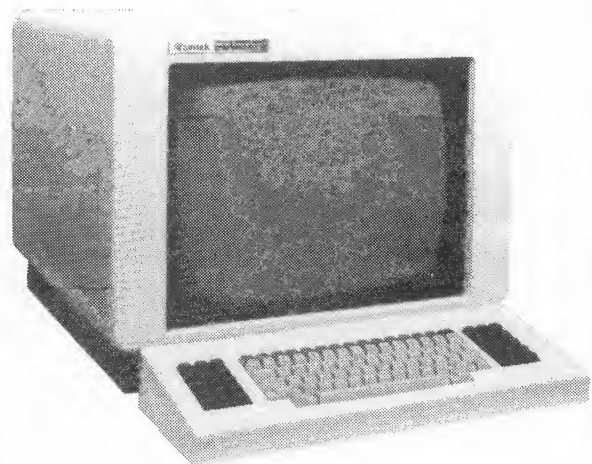
Headquarters Contact : **R. E. Peterson**

Telephone Number: **(408)735-8400**

## Key Features

Printing Technique/Screen Size : **13''**  
Maximum Characters Per Line : **1**  
Maximum Page Size : **1**  
Lower Case Available : **Yes, standard**  
Transmission Speed (char./sec.) : **2**  
Transmission Code : **7 or 8 bit ASCII**  
Internal Buffer : **variable. 4K min.**  
Weight : **150 lbs**  
Purchase Cost (Without Coupler) : **\$ 5,500**  
Monthly Cost for Service Contract : **\$ 42**  
Monthly Cost for One Year Lease (With Service) : **\$ n.a.**  
Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**  
Year Introduced : **1978**  
Approximate Number Installed : **n.a.**  
Serviced By : **Ramtek**

Model: **6110 COLORGRAPHIC TERMINAL**



## General Description

- Fully integrated Colorgraphics capability
- State-of-the-art raster scan technology
- Medium resolution color display
- 320x240 displayable graphics matrix
- Modular, microprocessor-controlled architecture
- Intuitive colorgraphics programming language
- TTY serial, asynchronous interfacing
- Independent alphanumeric & colorgraphic displays
- TV compatible display format
- Hardcopy interface

The Ramtek 6110 is a low cost, Colorgraphics computer terminal with bit-per-element display memory and a TV compatible display format. The Ramtek 6000 Series gives to the computer graphics marketplace a highly-modular and compatible graphics terminal line which allows you to get full-color output from your computer. Ramtek gives you cost-effective Colorgraphics today.

The 6100 Colorgraphic Computer Terminal integrates the latest in raster scan graphics and microprocessor technology with a resident graphics programming language to provide a low cost Colorgraphics terminal. The Colorgraphics Language is a powerful set of user-oriented commands that are easy to learn and easy to use. This offers computer graphics users an efficient way to add color to their existing graphics applications. It allows non-graphics users an effective way to move directly to Colorgraphics.

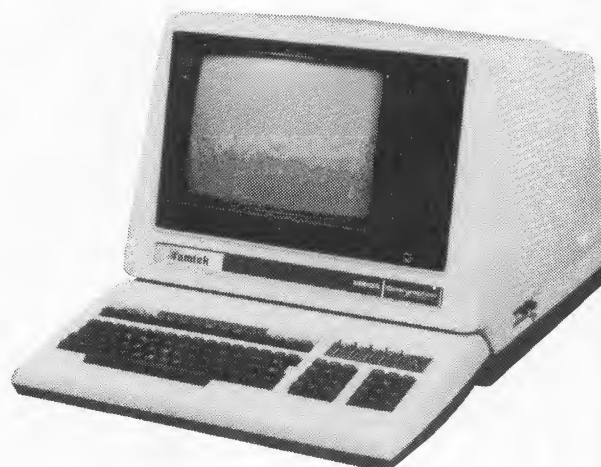
<sup>1</sup> Graphics 320x240 pixels; Alpha 80 columns x 24 lines

<sup>2</sup> 110-9600 baud, greater than 1200, may require handshake protocol

Company Name : **RAMTEK CORPORATION**  
 Headquarters Address : **585 No. Mary Ave., Sunnyvale, CA 94086**  
 Headquarters Contact : **R. E. Peterson** Telephone Number: **(408)735-8400**

## Key Features

Printing Technique/Screen Size : **13"**  
 Maximum Characters Per Line : **1**  
 Maximum Page Size : **1**  
 Lower Case Available : **Yes, standard**  
 Transmission Speed (char./sec.) : **2**  
 Transmission Code : **7 or 8 bit ASCII**  
 Internal Buffer : **2KInput buffer\***  
 Weight : **140 lbs**  
 Purchase Cost (Without Coupler) : **\$ 9,950**  
 Monthly Cost for Service Contract : **\$ 75**  
 Monthly Cost for One Year Lease (With Service) : **\$ n.a.**  
 Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**  
 Year Introduced : **1977**  
 Approximate Number Installed : **n.a.**  
 Serviced By : **Ramtek**  
 \*(up to 12K user scratchpad

 Model: **6200A COLORGRAPHIC TERMINAL**


## General Description

- Fully integrated Colorgraphics capability
- High resolution color display
- Powerful Colorgraphic programming language
- State-of-the-art raster scan technology
- Interactive graphic input option
- Modular microprocessor-controlled architecture
- Teletype™ ASR-37 compatible (RS-232C and full ASCII)
- Independent color alphanumeric and graphic displays
- Hardcopy Interface

The 6200A Colorgraphic Computer Terminal integrates the latest in raster scan graphics and microprocessor technology with an Interpretive graphics programming language to provide a comprehensive Colorgraphics terminal. The Colorgraphic Programming Language is a powerful set of user-oriented commands that are easy to learn and easy to use. This offers graphics users an efficient way to add color to their existing graphics applications. It allows non-graphics users an effective way to move immediately to Colorgraphics.

The 6200 has full color graphic and alphanumeric capabilities. The Independent graphic and alphanumeric random access memories (RAM) may be viewed either together or separately. This provides maximum flexibility to the user. The bright, flicker-free color display may be easily viewed in typical ambient light conditions. And, in addition, Colorgraphics maximizes the utility of the information displayed.

Teletype compatibility allows the user immediate access to his computer system. The 6200A has several options available to increase the graphics utility of the terminal in the computer graphics movement.

<sup>1</sup> Graphics 512x256; Alpha 72 columns x 25 lines

<sup>2</sup> 110-9600 baud, greater than 1200, may require handshake protocol.



Company Name : **RAMTEK CORPORATION**

Headquarters Address : **585 No. Mary Ave., Sunnyvale, CA 94086**

Headquarters Contact : **R. E. Peterson** Telephone Number: **(408)735-8400**

**Key Features**

Printing Technique/Screen Size : **19"**

Maximum Characters Per Line : **1**

Maximum Page Size : **1**

Lower Case Available : **Yes, standard**

Transmission Speed (char./sec.) : **2**

Transmission Code : **7 or 8 bit ASCII**

Internal Buffer : **Variable. 4K min.**

Weight : **175 lbs**

Purchase Cost (Without Coupler) : **\$ 25,000**

Monthly Cost for Service Contract : **\$ 188**

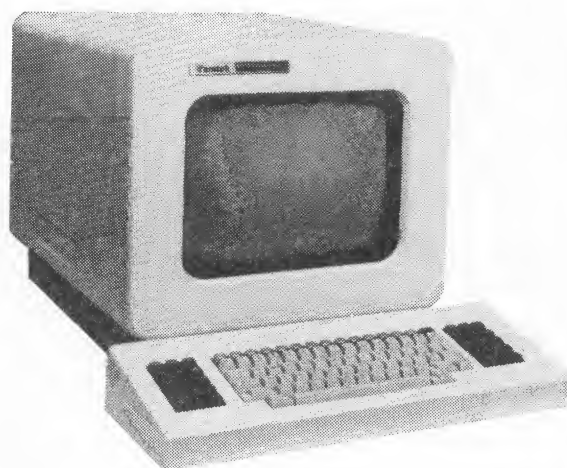
Monthly Cost for One Year Lease (With Service) : **\$ n.a.**

Monthly Cost for Three Year Lease (With Service) : **\$ n.a.**

Year Introduced : **1978**

Approximate Number Installed : **n.a.**

Serviced By : **Ramtek**

Model: **6310 COLORGRAPHIC TERMINAL****General Description**

- fully integrated Colorgraphics capability
- state-of-the-art raster scan technology
- ultra-high resolution color display
- 800x600 displayable graphics matrix
- 1024x1024 addressable graphics memory
- modular, microprocessor-controlled architecture
- hardware color zoom/pan
- intuitive Colorgraphics programming language
- TTY serial, asynchronous interfacing
- independent Colorgraphics & Alphanumeric Displays
- hardcopy interface

The Ramtek 6310 is an ultra-high resolution Colorgraphics computer terminal which provides the sophisticated computer graphics user the most advanced color and graphics raster scan terminal available. The Ramtek 6000 Series gives to the computer graphics marketplace a highly-modular and compatible graphics terminal line which allows you to get full-color output from your computer. Ramtek gives you the highest technology Colorgraphics today.

The 6310 Colorgraphic Computer Terminal integrates an ultra-high resolution display, the latest in raster scan graphics and microprocessor technology with a resident graphics programming language to provide the technology leader in Colorgraphics terminals. The Colorgraphics language is a powerful set of user-oriented commands that are easy to learn and easy to use. This offers graphics users an efficient way to add color to their existing graphics applications. It allows non-graphics users an effective way to move directly to Colorgraphics.

<sup>1</sup>Graphics 800 x 600 pixels; Alpha 80 columns x 40 lines

<sup>2</sup>110-9600 baud greater than 1200, may require handshake protocol.

Date: **November, 1978**Submitted By: **R. E. Peterson, Product Manager**

Company Name : **TEXAS INSTRUMENTS INCORPORATED**

Headquarters Address : **P.O. Box 1444, M/S 7796, Houston, TX 77001**

Headquarters Contact : **Nick Gelser, Product Manager** Telephone Number: **(713)937-2054**

## Key Features

Printing Technique/Screen Size : **Thermal Printing**

Maximum Characters Per Line : **80**

Maximum Page Size : **8.5" Wide Roll (300')**

Lower Case Available : **Standard**

Transmission Speed (char./sec.) : **Up to 1200 Baud**

Transmission Code : **USASCII**

Internal Buffer : **485 Characters**

Weight : **60 lbs**

Purchase Cost (Without Coupler) : **\$ 5,195**

Monthly Cost for Service Contract : **\$ 38**

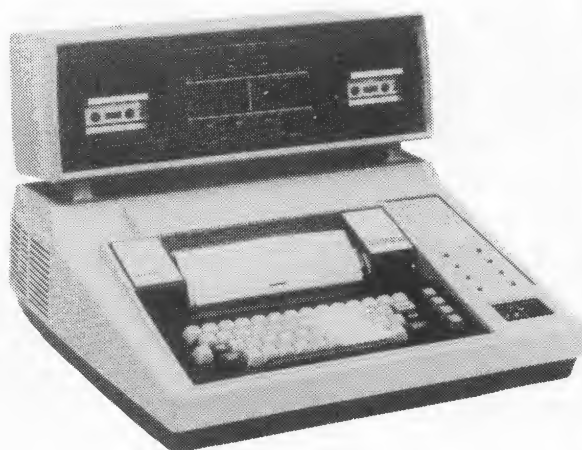
Monthly Cost for One Year Lease (With Service) : **\$ 230**

Monthly Cost for Three Year Lease (With Service) : **\$ 185**

Year Introduced : **1975**

Approximate Number Installed :

Serviced By : **Texas Instruments**

Model: **742**


## General Description

The Silent 700 Model 742 is a completely self-supporting Intelligent terminal, requiring no extra peripherals to generate, edit, translate, and execute application programs. Standard features include:

- USASCII Keyboard with built-in numeric cluster
- 2K RAM and 8K ROM
- Complete block and character editing capability
- Basic control programs resident in nonvolatile ROM
- Dual magnetic tape cassette operating system under local program control or central computer control, using control codes.

### Options Include:

- Extended communications capabilities
- Built-in modem
- Memory expansion.

Company Name : TEXAS INSTRUMENTS INCORPORATED

Headquarters Address : P.O. Box 1444, M/S 7796, Houston, TX 77001

Headquarters Contact :

Telephone Number: (512) 250-7305

## Key Features

Printing Technique/Screen Size : 12"

Maximum Characters Per Line : 80

Maximum Page Size : 8"W x 4"H

Lower Case Available : Upper & Lower

Transmission Speed (char./sec.) : up to 4800 bps

Transmission Code : 1

Internal Buffer : 2

Weight : 65lbs

Purchase Cost (Without Coupler) : \$ 4,995

Monthly Cost for Service Contract : \$ 58

Monthly Cost for One Year Lease (With Service) : \$ 210

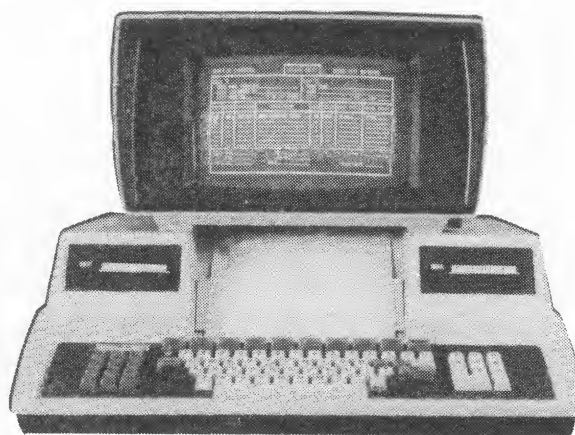
Monthly Cost for Three Year Lease (With Service) : \$ 190

Year Introduced : 1977

Approximate Number Installed : Over 50

Serviced By : Texas Instruments Incorporated

Model: TEXAS INSTRUMENTS MODEL 770



## General Description

- Mass storage is provided by dual minicartridge magnetic tape drives
- 770/2 includes an internal 30 cps thermal printer
- Standard memory is 24K bytes Rom/8K bytes Ram. Expandable to 24K bytes Rom/24K bytes Ram
- Options include:
  - Special graphics character set
  - Internal modems and interfaces to external Modems; Auto-call and/or Auto-answer capability
  - Omni 800 Model 810 impact, 150 cps printer
- Two communications ports are standard
- Emulators for IBM 2780, 3780, TTY, and TI742 are available
- Program language is TPL 700 - upward compatible with 771 Intelligent Terminal and 774 Intelligent Terminal System.

<sup>1</sup> 8-bit ASCII asynchronous/8-bit EBCDIC, BSC protocol with CRC checking supported by internal and external modem and auto-call options.

<sup>2</sup> 8 key stroke buffer; 1920 character screen buffer; for communications—specified by program.





Company Name : **TEXAS INSTRUMENTS INCORPORATED**

Headquarters Address : **P.O. Box 1444, M/S 7796, Houston, TX 77001**

Headquarters Contact : **Steve Wolf** Telephone Number: **(512) 250-7305**

**Key Features**

Printing Technique/Screen Size : **12"**

Maximum Characters Per Line : **80**

Maximum Page Size : **8"W x 4"H**

Lower Case Available : **Upper & Lower**

Transmission Speed (char./sec.) : **up to 4800 bps**

Transmission Code : **1**

Internal Buffer : **2**

Weight : **110 lbs**

Purchase Cost (Without Coupler) : **\$ 7,450**

Monthly Cost for Service Contract : **\$ 80**

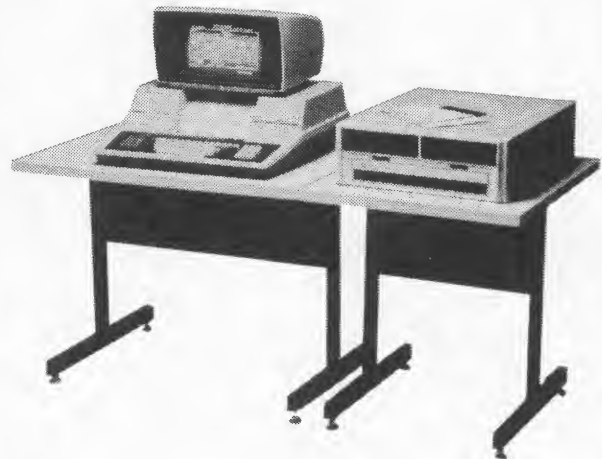
Monthly Cost for One Year Lease (With Service) : **\$ 310**

Monthly Cost for Three Year Lease (With Service) : **\$ 285**

Year Introduced : **1978**

Approximate Number Installed : **Over 50**

Serviced By : **Texas Instruments Incorporated**

Model: **TEXAS INSTRUMENTS MODEL 771****General Description**

- Mass storage is provided by dual diskette drives
- 771/2 includes an internal 30 cps thermal printer
- Options include:
  - Special graphics character set
  - Internal modems and interfaces to external modems, auto-call and/or auto-answer capability
  - Omni 800 Model 810 impact, 150 cps printer
- Two communications ports are standard
- Emulators for IBM 2780, 3780, TTY, and TI742 are available
- Program language is TPL700 - compatible with Model 770 Intelligent Terminal and Model 774 Intelligent Terminal System.

<sup>1</sup> 8 bit ASCII asynchronous/8 bit EBCDIC, BSC protocol with CRC checking, supported by internal or external modem and auto-call options.

<sup>2</sup> 8 key stroke buffer; 1920 character screen buffer; for communications—specified by program.

Date: **November, 1978**Submitted By: **Steve Wolfe, Marketing Product Manager**



## REMOTE BATCH SERVICES

<b>ADP Network Services, Inc.*</b> .....	XXX.020
<b>Avco Computer Services</b> .....	XXX.040
<b>CallData Systems, Inc.</b> .....	XXX.080 - XXX.081
Computel Systems Ltd. ....	XXX.120 - XXX.121
Computer Sharing Services, Inc. ....	XXX.160
<b>Informatics, Inc.</b> .....	XXX.200
McDonnell Douglas Automation Company .....	XXX.240 - XXX.241
Mellonics Information Center .....	XXX.280
PRC Computer Center, Inc. ....	XXX.320
<b>Rapidata, Inc.</b> .....	XXX.360 - XXX.361
Service Bureau Company, The .....	XXX.400
<b>United Computing Systems</b> .....	XXX.440
<b>University Computing Company</b> .....	XXX.480 - XXX.483

\*Companies shown in **bold print** are Corporate Associate Members of AT&T





Company Name : **ADP NETWORK SERVICES, INC.**

Headquarter Address : **180 Jackson Plaza, Ann Arbor, MI 48106**

Hours Available : **24 hours, 7 days per week**

Toll-Free Access Areas : **Major cities in the U.S. and Western Europe**

Toll-Free Hot Line : **Yes**

Approximate number of current users : **n.a.**

Remote Batch Terminals Supported : **n.a.**

Line Speeds Supported : **110, 300, 1200, 2400, 4800, 9600 baud**

Headquarters contact : **Bruce Wilson** Telephone No.: **(313) 769-6800**

### System Configuration & Pricing Information

ADP Network Services provides a full complement of remote computing services including timesharing and remote batch services. We specialize in providing practical computing solutions to information management problems. The ADP user can utilize the same data and programs in both timesharing and remote batch. ADP offers three variations of remote batch services:

**BATCH SERVICES** - permits any ADP client to enter a job for deferred processing. The job is processed at the ADP Technical Center and the results are ready in a file on the client's account user number later that day or the next morning. Special commands are available to specify in advance what actions the system should take if it encounters an error condition (such as an invalid data format).

**HISPEED SERVICE** - enables the user to enjoy the full range of capabilities that only high speeds can provide for fast turnaround of report, listing and other information. HISpeed Service has a special Command Language designed to maximize the throughput of the service while minimizing the required operator attention.

**CUSTOM REMOTE SERVICE** - provides the client with a powerful production center (called a Custom Remote Work Station) which remains under the client's control at all times. Design, delivery, installation and maintenance are provided by ADP Network Services.

### Special Features

ADP also offers batch and timesharing services through the **ONSITE** service. ADP **ONSITE** combines the remote computing advantages of a full-service solution with a new level of cost-effectiveness derived from recent advances in semi-conductor technology and computer architecture, and the proven capabilities of the ADP international teleprocessing network and proprietary software.

The ADP **ONSITE** equipment provides ample processing capacity for 16 to 32 users in a typical on-line work mix, depending upon the **ONSITE** configuration. **ONSITE** service may be configured with up to 2.5 megabytes of semiconductor memory and up to 1.5 billion bytes of mass storage. An extensive range of available peripheral devices makes the **ONSITE** service suitable for a wide variety of applications and usage profiles. With high density packaging and an absolute minimum of inherent environmental constraints, ADP **ONSITE** service may typically be installed in an ordinary office.

Company Name : **AVCO COMPUTER SERVICES**Headquarter Address : **201 Lowell Street, Wilmington, MA 01887**

Hours Available : **7 days per week, 24 hours per day**  
Toll-Free Access Areas : **Continental United States**  
Toll-Free Hot Line : **No**  
Approximate number of current users : **150**  
Remote Batch Terminals Supported : **IBM 2780, 3780 and HASP Workstation compatible**  
Line Speeds Supported : **2400 Baud, 4800 Baud, 9600 Baud, 19,200 Baud**  
Headquarters contact : **Edwin A. Mercer, Jr.** Telephone No.: **(617) 729-7700**

**System Configuration & Pricing Information**

Avco operates multiple IBM 370/158's in an MVS JES2 Multi Access Spool Environment. Programs and/or data can be inputted and/or executed in the Batch Processing Mode and/or Time-sharing Mode (TSO). Charges are utilization and priority dependent. Presented below are the ACU Hourly Rates in the lowest and highest utilization categories.

PRIORITY	UTILIZATION PER AVCO FISCAL MONTH	
	0 - 4.99 ACU Hours:	50 and Over ACU Hours:
High Priority	\$700	\$570
Prime	\$630	\$500
Non-Prime	\$570	\$440
Deferred	\$480	\$380

The above rates are for problem programs requiring up to 100K of memory. Add \$60.00 to above rates for each additional 100K of memory required. K = 1024 Bytes.

On-line 3330 type storage \$0.03 per track per day

Connect Time	2400 Baud	\$10.00 per connect time hour
(Computed based on	4800 Baud	\$10.00 per connect time hour
elapsed time from	4800 Baud	\$28.00 per connect time hour (This is
signon to signoff)		toll free service for contiguous
		continental United States
		except Massachusetts)

**Special Features**

There are no charges for input and/or output at terminal locations.

Bulk sales arrangements are encouraged and are handled on an individual basis.

Dedicated leased line service is available.



Company Name : CALldata SYSTEMS, INC.

Headquarter Address : 20 Crossways Park North, Woodbury, NY 11797

Hours Available : Monday to Friday, 0700-2000; Saturday 0800-1700, Eastern time zone  
Toll-Free Access Areas : Continental U.S. except Mass., Boston is toll-free. Convl. access via TELENET  
Toll-Free Hot Line : Support is provided by district sales offices  
Approximate number of current users : n.a.  
Remote Batch Terminals Supported : UT200 or compatible; HASP workstation via TELENET to Calldata's TS\*RJE  
Line Speeds Supported : 10 to 120 cps asynchronous; 2000 to 50K Baud bisynchronous  
Headquarters contact : Aron Prochko Telephone No.: (516) 575-6558

### System Configuration & Pricing Information

TeleScope™ combines the computing power and precision the scientific and engineering community expects from a large scale CDC machine with the ease-of-use and interactive capabilities of a time-sharing system. Intercom permits interactive job execution, text-editing, and job submittal and review to the Batch processor with a local call from over 135 cities.

CPU - Dual CDC Cyber 172 NOS/BE Version 1 PSR 454

262K main memory; 256K extended memory

Tape - CDC 9 track 1600/800 BPI

CDC 7 track 800/556/200 BPI

Disk - CDC 844 — 233 million characters/disk

Printer - DataProducts 2550 — 1000 lpm

Punch - CDC 415

Communications - CDC 2550

Pricing is based upon the response requested, interactive, one hour, four hours or overnight service and resources, CPU and I/O data blocks, consumed. Terminal connect charges are assessed for communications dial-up services. Additional charges are for permanent disk storage and tape rental. The user assumes a small overhead charge for Amdahl job transfer to/from TeleScope via TIELINE.

### Special Features

- On-line job entry via Intercom
- Interactive and/or Batch job processing
- Numerous application packages and libraries; DBMS
- All major programming languages
- Complete documentation
- Optional job entry from IBM RJE via TIELINE
- Generalized graphics support
- Pre and post processors for many engineering programs
- Free technical support

Date: January, 1979

Submitted By: Aron Prochko, Assistant Director of Marketing





Company Name : **CALLDATA SYSTEM, INC.**

Headquarter Address : **20 Crossways Park North, Woodbury, NY 11797**

Hours Available : **24 hours/day Monday-Saturday; Sunday 1200-2400 (Eastern time zone)**

Toll-Free Access Areas : **Continental U.S. except Mass.; Boston is toll-free. Convl. access via TELENET**

Toll-Free Hot Line : **Assistance is provided by district sales offices**

Approximate number of current users : **n.a.**

Remote Batch Terminals Supported : **TTY asynchronous; IBM 2780, 3780, 360, 370, 1130, System 3, etc or lookalikes**

Line Speeds Supported : **10 to 120 cps asynchronous; 2000 to 50K Baud blsynchronous**

Headquarters contact : **Aron Prochko** Telephone No.: **(516) 575-6558**

### System Configuration & Pricing Information

With the Calldata TS\*RJE/Batch system, you can use either your own terminals or the facilities of the Calldata district offices to enter batch jobs on our 3-million byte Amdahl 470 OS/VS computer. Since this system operates in a multi-programming mode, it can satisfy the fast turnaround requirements of testing, debugging, and implementing large software system. The advantages for productive use of such systems are increased by the virtual storage (VS) feature that provides almost unlimited memory. Conversational RJE and text editing is provided by MENTEXT\*.

CPU - Amdahl 470V/5 OS/VS2 HASP, MENTEX  
Tape - STC 9 Track Dual Density 6250/1600 and 1600/800 BPI  
STC 7 Track Dual Density 800/556 BPI  
Disk - IBM 2314 and 3330 mod 11  
STC 8100 (3330 mod 1 compatible)  
STC 8350 (3350 compatible)  
Printer - IBM 1403NI and 3211 with HN and TN trains  
Punch - IBM 2540  
Communications - IBM 3705

Pricing is based upon the response requested: conversational, one hour, four hours or overnight priority. Connect charges are assessed for dial-up services at prime and reduced non-prime rates. Additional charges are permanent disk storage and tape rental, mounting fees and, when using a Calldata remote station card reading and punching and line printing.

\*MENTEXT is a product of Mentel, Inc.

### Special Features

- Optional on-line job entry via MENTEXT or VM/CMS Time-sharing
- Numerous application packages and libraries; all major programming languages
- Linked to Calldata's CDC TeleScope™ service
- Versatile terminal/communications support
- Conversational text-editing
- Complete documentation
- User-controlled job execution with SJP
- Data\*Lock™ software security
- JCL Job Scanner
- Free technical support



Company Name : COMPUTEL SYSTEMS LTD

Headquarter Address : 1200 St. Laurent Blvd., Ottawa, Ontario K1K 3B8

Hours Available : Mon. 0700-2400; Tues-Fri 0000-2400; Sat 0000-2000; Sun 0700-2000 \*

Toll-Free Access Areas : Toronto, Edmonton and Victoria, Synchronous toll-free access

Toll-Free Hot Line : Yes, Toronto and Montreal

Approximate number of current users : 65

Remote Batch Terminals Supported : Any terminal that exactly emulates a 360 model 20: 2780; 3780; 3741

Line Speeds Supported : 2000 bps to 50K bps (Batch); 124 bps to 9600 bps (Interactive)

Headquarters contact : Mr. G. Gow, V.P. - Marketing & Sales Telephone No.: (613) 746-4353

### System Configuration & Pricing Information

#### IBM MVS/JES3 COMPLEX

Two IBM 370/168 - 6 MB processor storage each

One IBM 3033 - 8 MB processor storage

One IBM 3851/A2 Mass Storage System - 102 billion bytes

102 Disk drives (3350, 3330-I, 3330-II, 2314)

41 Tape drives (7 and 9 track, 200 - 6250 bpi)

5 Line printers (1,100 and 2,000 lpm)

On-site card reading and punching

#### OPERATING SYSTEM

MVS 3.7 with JES3 Version 18 (see Special Features below)

Pricing information available on request, based on resource billing.

\*(All days except December 25)

### Special Features

**IBM 3850** - Low cost, high volume storage appropriate for many current batch applications. Improved information availability.

**RACF** - State-of-the-art software security.

**NETWORK** - An intelligent communications network, supported by Computel's Network Control Centre offering nation-wide access to the Ottawa complex. Cost-effective communications, centrally managed with built-in monitoring and diagnostic capability.

**MVS/JES3** - Current IBM operating system with features such as Single System Image; Dependant Job Control; advanced recovery and diagnostic capabilities.



Company Name : COMPUTEL SYSTEMS LTD

Headquarter Address : 1200 St. Laurent Blvd., Ottawa, Ontario K1K 3B8

Hours Available : Mon, Thurs, Fri: 0000-2400; Tues: 0000-2200; Wed: 0400-2400; Sat&Sun: 0800-1700

Toll-Free Access Areas : Toronto, Edmonton and Victoria synchronous toll-free access

Toll-Free Hot Line : Yes, Toronto and Montreal

Approximate number of current users : 50

Remote Batch Terminals Supported : \*\*

Line Speeds Supported : 2000 bps to 50K bps (batch); 124 bps to 9600 bps (interactive)

Headquarters contact : Mr. A. Mulr, Mgr. - Univac Dev. Support Telephone No.: (613) 746-4353

### System Configuration & Pricing Information

UNIVAC 1108 with 262K words (36-bit) modular memory, cycle time 750 nsec.

3 x 432 drums

1 x 1782 Drum

10 x 8440 Disc drives - 1.4 billion on-line characters

8 x 9 Track tape drives

5 x 7 Track tape drives

2 x CHI communication processors

On-site printing/card reading/punching

Software level 33R2 of O/S 1100 supporting Batch, Remote Batch, Time-sharing and Real-Time services.

Pricing information available on request, based on resource billing.

\*(All days except December 25)

\*\*Any terminal that emulates a UNIVAC 1004; DCT2000; NTR; IBM 2780; HAST Model 20.

### Special Features

**NETWORK** - An intelligent communications network, supported by Computel's Network Control Centre offering nation-wide access to the Ottawa complex, Cost-effective communications, centrally managed with built-in monitoring and diagnostic capability.

**DEMAND** - Control language in DEMAND is identical to BATCH therefore all BATCH work can be processed in the DEMAND mode with no changes. Special interactive compilers do in-line editing. APL is available.

Company Name : **COMPUTER SHARING SERVICES, INC.**

Headquarter Address : **2498 West Second Avenue, Denver, CO 80223**

Hours Available : **3:00 AM-12:00 midnight M-F; 3:00 AM-6:00 PM Sat; 10:00 AM-12:00 mid Sun.**  
Toll-Free Access Areas : **United States, Canada, Mexico, some European and Asian countries**  
Toll-Free Hot Line : **No**  
Approximate number of current users : **n.a.**  
Remote Batch Terminals Supported : **1**  
Line Speeds Supported : **2**  
Headquarters contact : **Dan Walkovitz** Telephone No.: **(303) 934-2381**

## System Configuration & Pricing Information

- **CSS Background Mode (remote batch service) runs on a Honeywell dual 66/27 system.**
- **Dartmouth Time Sharing System is the operating software.**
- **There are three priorities for Background Processing, and they are priced accordingly.**  
**Immediate Priority, \$0.18 per Computer Resource Unit (CRU)**  
**Delayed Priority, \$0.08 per CRU**  
**Overnight Priority, \$0.03 per CRU**  
**Other pricing options are also available.**
- **All programs, files, and language processors are the same for both Foreground and Background.**
- **Most of the tasks you can do interactively can also be performed in Background.**  
**Run programs**  
**Print files**  
**Use magnetic tapes**  
**Dump output to high-speed printer**

<sup>1</sup> All common asynchronous terminals; 3270-type synchronous terminals for high-speed remote job entry.

<sup>2</sup> 110, 124.5, 150, 300, and 1200 baud asynchronous; 4800 and 2000 baud synchronous.

## Special Features

- **Background mode is ideal for long-running programs.**
- **Higher memory limits are available in Background.**

Company Name : **INFORMATICS, INC.**Headquarter Address : **6 Kingsbridge Road, Fairfield, NJ 07006**

Hours Available : **7 days a week, 24 hours per day**  
Toll-Free Access Areas : **New York City, Northern New Jersey, Washington DC, San Francisco, Los Angeles**  
Toll-Free Hot Line : **Yes**  
Approximate number of current users : **n.a.**  
Remote Batch Terminals Supported : **Any terminal capable of emulating an IBM 2780, 3780, or 360 Hasp Workstation**  
Line Speeds Supported : **2000, 2400, 4800**  
Headquarters contact : **David Aach** Telephone No.: **(201) 575-2800**

**System Configuration & Pricing Information****MAINFRAMES - IBM 370/158 III-4096K, ITEL AS/5 III - 3072K****OPERATING SYSTEM - OS/VS2 Release 1.6; HASP III****PERIPHERALS - 9 Track - 800, 1600, 6250 BPI Tape Drives 3330 and 3350 DASD; 1403 and 3211 Printers; Card Readers and Card Punch****PRICING (Partial list shown, contact company for further details)**

RESOURCE	CHARGE
Computer resource (IRU)	\$0.10
Tape Mount	\$2.00
Customer Reserved disk space - Cylinders (1-5)	\$35.00 each
Unit Record Accesses (per 1000)	\$1.00
Cards Read	\$3.00
Cards Punched	\$3.00
Lines Printed - One-part paper	\$1.00
Initiation of service	\$100.00
Minimum IRU charge per job	\$1.00

The IRU is a combination of resources used including core used, scheduling priority requested, CPU time, and EXCP's accumulated.

**Special Features**

Discounts are available for users selecting overnight (20% Discount) or weekend (30% Discount) job scheduling.

MODEL 204 is an on-line DBMS which can be accessed via low speed lines available in the 70 major U.S. cities.

All batch services can also be utilized via low speed terminals using the time-sharing system. Jobs can be submitted, controlled and routed back to users logged onto the Informatics Conversational Monitor System.

Languages Supported: FORTRAN G and H. WATFIV; COBOL ANS2, ANS4, VS COBOL; PLI OPTIMIZER, PLI/F; VS ASSEMBLER, ASSEMBLER H; RPG E; GPSS V.

Additional Features: CICS; IMS/VS DB 1.0.1; PREMIS; BMDP; CSMP; MARK IV; RECON; SAS; MODEL 204; RAMIS II; ACCOUNTING IV; SPSS; SYNCSORT.



Company Name : MCAUTO (McDonnell Douglas Automation Company)

Headquarter Address : P.O. Box 516, St. Louis, MO 63166

Hours Available : 6:00 a.m. - 1:00 a.m. M thru F; 6:00 a.m. - 8:00 p.m. Sat. Central Time

Toll-Free Access Areas : Continental United States (excluding Alaska)

Toll-Free Hot Line : No

Approximate number of current users : 500

Remote Batch Terminals Supported : 200 UT or devices that emulate the 200 UT; HASP Workstation terminals

Line Speeds Supported : 2000 and 4800 bps

Headquarters contact : L. R. Buschman

Telephone No.: (314) 232-4640

### System Configuration & Pricing Information

The MCAUTO CYBER Service consists of three Control Data Corporation (CDC) CYBER 175 computing systems located in St. Louis, Missouri. The systems run under NOS 1.1 (NOS. 1.3 approximately February 1979) with many modifications by MCAUTO to reflect our own remote computer services philosophy.

The Network Operating System allows the 175's to be used in a multi-mainframe environment in which Extended Core Storage (2 million words) and all production disc files (10 billion 6-bit characters) are shared among the three systems. This is a positive benefit for MCAUTO clients in several ways: 1) reliability of the network is improved because the user can access his files from any mainframe, 2) turnaround times are good because batch jobs can be submitted on one system and executed on another if necessary, 3) timesharing and batch work is completely integrated without physically moving files between systems.

Charges for the remote batch service are accumulated in three primary areas - Connect Time, On-line Storage, and Main Resource Units. The Main Resource Unit (MRU), which essentially measures central processor resources required by a job, is divided into five service levels called EXPRESS, STANDARD, ECONOMY, DEFERRED, and WEEKEND. Each service level has a turnaround time associated with it and carries a different price per MRU. The user has the option to select any level that is appropriate for his present needs.

Specific unit rates are available by contacting your nearest MCAUTO Marketing Office.

### Special Features

MCAUTO also offers the 370 Service based upon IBM hardware. The CYBER Service and the 370 Service communicate with each other through a link devised and implemented by MCAUTO.

Through this link MCAUTO clients have access to either service and its unique advantages. For example, applications that reside only on the 370 Service are yet executable through the CYBER Service; remote batch terminals normally associated with IBM hardware can be used indirectly to access the CYBER Service. MCAUTO offers the best of both hardware types to our users.





Company Name : MCAUTO (McDonnell Douglas Automation Company)

Headquarter Address : P.O. Box 516, St. Louis, MO 63166

Hours Available : 8:00 a.m. - 12:00 p.m. Monday thru Saturday (Central Time)  
Toll-Free Access Areas : Continental United States (excluding Alaska)  
Toll-Free Hot Line : No  
Approximate number of current users : 1380  
Remote Batch Terminals Supported : IBM Computers, IBM Terminals, other computer/terminals which emulate IBM  
Line Speeds Supported : 2000, 2400, 3600, 4800, 7200, 9600, 50KB  
Headquarters contact : G. L. Henderson Telephone No.: (314) 232-6963

### System Configuration & Pricing Information

The MCAUTO IBM 370 service currently consists of three 3033's, one 3032 and six 168's in the St. Louis, Missouri complex, plus three 3033's and three 168's in the Long Beach, California complex. Both centers operate in a multi-mainframe environment under JES/3 with MVS release 3.7. MCAUTO consistently achieves 99% availability. 90% of jobs which require set up are completed in less than one hour, and 98% of jobs which require no set up are completed in less than 30 minutes. MCAUTO's commitment to serving client needs includes a total communications network and a stable processing environment.

Pricing available upon request.

### Special Features

MCAUTO also offers CYBER service based upon Control Data Corporation (CDC) hardware. The IBM 370 service and the CYBER service communicate with each other through a link devised and implemented by MCAUTO. Through this link MCAUTO clients have access to either service. For example, remote batch terminals normally associated with IBM hardware can be used indirectly to access the CYBER service. MCAUTO offers the best of both hardware types to our users.

Company Name : MELLONICS INFORMATION CENTER, Litton Systems, Inc.

Headquarter Address : 6701 Variel Avenue, Canoga Park, CA 91303

Hours Available : --  
Toll-Free Access Areas : Toll free access available from over 80 cities in U.S.  
Toll-Free Hot Line : No  
Approximate number of current users : --  
Remote Batch Terminals Supported : IBM 2770, 2780, 3780, 1130, Model 20, 360, System 3. \*  
Line Speeds Supported : 2,000, 4800 dial-up  
Headquarters contact : John L. Cudworth Telephone No.: (213) 887-5100

## System Configuration & Pricing Information

### I/O DEVICES

Two IBM 370/3033's 8 and 6 megabyte — 40 tape drives — 104 disk drives — Printers: (1) 3211, (2) 3800's, (1) 1403N1 — Card readers: (2) 3505's, (2) 2501's — Card Punch: (1) 3525 — Paper tape reader: (1) 2671 — Paper tape punches: (2) 1018's — Teleprocessing controllers: (3) 3705 — Drum Storage Units: (2) 2305 — Datagraphix Com recorder.

### BATCH WORK

Operating Systems - O/S MVS, JES2, UCC Two (DUO) DOS Simulator  
Job Classes - Priority, Express, Regular, Scheduled production, Deferred  
Programming Languages - FORTRAN IV, PL/I, Assembler, COBOL, RPG, DL/I, GIS/VS  
Utilities - DYL-250, DYL-260, FDR, PANVALET, CALCOMP, SSPLIB, CPO, DATAGRAPHIX, SORT, Standard IBM O/S utilities.

### Pricing Information

Contact Mellonics Information Center

\*Other non-IBM equivalents such as Data-100, HARRIS.

## Special Features

IMS/DC, GPSS, PMS IV, CSMP, ECAP, CFMS, APT, SPSS, FORESIGHT, TOTAL BIOMED, RAMIS, TSO

Application packages under TSO - MIS, FORESIGHT, RAMIS

ATMS - Microfiche Services

TERMINALS SUPPORTED - 2741 equiv., ASCII, 327X equiv.



Company Name : PRC COMPUTER CENTER, INC.

Headquarter Address : 7670 Old Springhouse Road, McLean, VA 22102

Hours Available : Twenty-four hours-seven days per week and all holidays.  
Toll-Free Access Areas : Information available upon request.  
Toll-Free Hot Line : No  
Approximate number of current users : Over 150  
Remote Batch Terminals Supported : IBM 2780, 3780, HASP, RJE Work Stations or Compatible terminals.  
Line Speeds Supported : 2400, 4800, and 9600 Baud  
Headquarters contact : George A. Thompson, Jr., V.P. Telephone No.: (703) 893-4800

### System Configuration & Pricing Information

#### HARDWARE

- 1 - Itel AS/5-I (3 megabytes of memory). The Itel AS/5 is a plug compatible replacement for the IBM 370/158.
- 1 - Itel AS/5-III (4 megabytes of memory).
- 16 - Tape Drives (7 Track, 9 Track - 800, 1600 and 6250 BPI)
- 6 billion bytes of on-line direct access storage (2314, 3330-I, 3330-II and 3350)
- 2 - Programmable Communications Control Units
- 2 - 2250 LPM Line Printers
- 2 - 1100 LPM Line Printers
- 2 - 1000 LPM and 300 CPM Reader/Punch Units

#### OPERATING SYSTEM

- OS/VS2 MVS
- JES2 Shared Spool with Remote Job Entry (RJE)
- TSO
- WYLBUR under TSO

#### PRICING

Available upon request

### Special Features

- Dual CPU loosely-coupled multiprocessing configuration via JES2 multi-access spool for on-line/remote job entry backup.
- Dual front-end processor configuration for communication system backup.
- Complete sharability of user DASD volumes for extended device accessibility.
- Easy access to batch processing from TSO and WYLBUR for job submission and output retrieval.
- Full output routing capabilities for RJE stations.
- Multiple output class and form structures for output processing flexibility.
- Full access security for batch and on-line users via TSO and ID, account/subaccount and password validation.
- Daily user disk volume backup facilities for batch and on-line systems.



Company Name : **RAPIDATA, INC.**

Headquarter Address : **20 New Dutch Lane, Fairfield, NJ 07006**

Hours Available : **Weekdays: 04:00 - 23:00; Sat. up 04:00 until Sun. down 23:00**

Toll-Free Access Areas : **United States, Canada, Hawaii and London, U.K.**

Toll-Free Hot Line : **Available only at local offices**

Approximate number of current users : **Over 500**

Remote Batch Terminals Supported : **IBM 2780 (BISYNCHRONOUS Transmission)**

Line Speeds Supported : **2000, 4800 Baud**

Headquarters contact : **Dorothy Monopoll** Telephone No.: **(201) 227-0035**

### System Configuration & Pricing Information

#### HONEYWELL SYSTEMS

5 dual processor Honeywell 437's with main memory of 98K bytes. Twenty-four bit word size. GTE-1000 front ends. Honeywell DSS drives provide more than 2,214 million characters of storage.

#### PRICING

Connect Time	Prime Time	Non-Prime	
2000 Baud	\$30/hr.	\$30/hr.	
4800 Baud	\$30/hr.	\$30/hr.	
CPU Units	Prime Time	Non-Prime	Weekends
Foreground	\$.07	\$.07	\$.07
Background	\$.07	\$.042	\$.024

#### STORAGE

On-Line - \$.60 per unit per month first 50 units per file.  
\$.20 per unit all units above 50 units per file.

\*Unit = 1000 characters or any part thereof.

### Special Features

#### HONEYWELL

- Bulk storage discounts are available upon request from Rapidata by execution of a storage rider.
- Deferred processing is available to enable the user to save terminal connect time costs and to take advantage of non-prime time CPU discounts.
- RapidLink is available to link the user's in-house IBM 360 or 370 to the appropriate Rapidata system.
- Off-line storage is provided at \$5.00/file/month.



Company Name : **RAPIDATA, INC.**  
Headquarter Address : **20 New Dutch Lane, Fairfield, NJ 07006**

Hours Available : **Weekdays 24 hrs., Sat. down 24:00, Sun. up 07:00, down 20:00**  
Toll-Free Access Areas : **United States, Canada, Hawaii and London, U.K.**  
Toll-Free Hot Line : **Available only at local offices**  
Approximate number of current users : **Over 500**  
Remote Batch Terminals Supported : **IBM 2780 (BISYNCHRONOUS)**  
Line Speeds Supported : **2000, 4800 Baud**  
Headquarters contact : **Dorothy Monopoli** Telephone No.: **(201) 227-0035**

### System Configuration & Pricing Information

#### RAPIDTEN SYSTEMS

2 DEC 1070's, memory size of 1,311K bytes, 1 DEC 1080 memory size of 1,311K bytes, each with GTE 1000 front end. ITEL and Digital disks provide an excess of 1,740 million characters of storage.

#### PRICING

Connect Time 2000, 4800 Baud	Prime Time \$30/hr.	Non-Prime Time \$30/hr.	
CPU Units	Prime	Weeknights	Weekends
Foreground	.07	.07	.07
Background (Off-Line)	.07	.042	.024
Instant Batch			
(High priority batch)	.08	.049	.028
RAPIDTEN Option			
(Foreground)	.07	.042	.024

#### STORAGE

##### On-Line

\$ .60 per unit per month for the first 50 units per file.  
\$ .20 per unit per month for all units above 50 units per file.  
\$ .10 per unit per month for all data storage units above 50 units per file.

### Special Features

- Bulk storage discounts are available upon request from Rapidata by execution of a storage rider.
- Background-10 deferred processing is available to enable the user to save terminal connect time and to take advantage of non-prime time CPU discounts.
- Mountable storage, private customer disk pack rental, is available for large volumes of data.
- Rapidlink is available to link the user's In-house IBM 360 or 370 to the appropriate Rapidata system.
- Discounted off-line Archive storage rates for files accessed infrequently are available.



Company Name : THE SERVICE BUREAU COMPANY

Headquarter Address : 500 West Putnam Avenue, Greenwich, CT 06830

Hours Available : 8 AM - 11 PM Eastern Time, Mon. - Fri., and for 12 hrs. on Sat. and Sun.  
Toll-Free Access Areas : Over 100 cities nationally and internationally  
Toll-Free Hot Line : Yes  
Approximate number of current users : n.a.  
Remote Batch Terminals Supported : Most terminals capable of emulating JES communications protocol (3270 support)  
Line Speeds Supported : 10,15,30 and 120 CPS for interactive users, 2000,2400,4800,7200,9600 Baud for RJE  
Headquarters contact : W. H. Warner Telephone No.: (203) 622-2044

### System Configuration & Pricing Information

CALL/PLUS places the processing power of a scheduled batch processing computer in the hands of the data processing professional. CALL/PLUS offers a conventional, familiar set of tools and supplies batch processing resources that are similar to, and compatible with the resources of the customer's own data processing system.

#### SYSTEMS SOFTWARE

- IBM Operating System OS/VS2, Release 3.7, Multiple Virtual Systems (MVS)
- Job Entry Subsystem 2 (JES2), Release 4
- OS/VS2 TSO, Time-Sharing Option, including SBC and IBM enhancements
- Standard access methods
- Language translators: ASSEMBLER; FORTRAN; VS BASIC; PL/I; COBOL; VS APL
- Source Library Management System - Panvalet
- Structured Programming Facility (SPF)

#### PRICING

Pricing falls into three (3) major areas listed below. The charges shown are only for the one class of service using a 120 CPS terminal and interactive TSO. Other differently priced services are available as listed on SBC's Standard Price Schedule. One and two year volume discounts are also available.

#### CALL/PLUS Connect Time Charges

Interactive Terminal Speed	Prime Time	Off-Hours
120 CPS	\$16.00 per hour plus \$.075/KCB	\$6.40 per hour plus \$.03/KCB

#### CALL/PLUS Process Unit Charges

Interactive TSO	\$ .100/Process Unit	Class 8 \$.036/Process Unit
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#### CALL/PLUS On-Line Storage Charges

3330 On-Line Disk	\$.08 per track/day
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### Special Features

The development and processing of applications through a remote computing service requires an extensive set of programmer and end-user oriented tools. Through the remote batch and time-sharing facilities of CALL/PLUS, these tools are made available in the form of programming languages, related support facilities and data base management software. This data base software is geared to the reporting requirements of application end-users, as well as the system design and installation needs of data processing professionals. The CALL/PLUS and CALL/370 (SBC's Management Timesharing Service) Applications Libraries provide data processing professionals and management end-users with some of the best Application Systems in the data processing industry today.





Company Name : **UNITED COMPUTING SYSTEMS**

Headquarter Address : **2525 Washington, Kansas City, MO 64108**

Hours Available : **5 am-2 am Weekdays, 6 am-midnight Saturday, 8 am-8 pm Sunday**

Toll-Free Access Areas : **Continental United States and London, England**

Toll-Free Hot Line : **No**

Approximate number of current users : **3000**

Remote Batch Terminals Supported : **CDC 200 UT, IBM 2780 or 3780 type terminals \***

Line Speeds Supported : **2000, 2400, 3600, 4800, 9600, 19.2K Band.**

Headquarters contact : **Larry E. Everitt, Product Manager** Telephone No.: **(816) 221-9700**

### System Configuration & Pricing Information

APEX/SL7 service for remote batch access is provided thru inward wats lines for the United States & Canada, and special lines for London, England. Leased communications direct lines are available in addition to the wats lines. The timesharing access communications system "UNINET" provides timesharing access from over 105 cities, and has remote job entry (RJE), and remote batch entry (RBE) for submitting a file of control cards to the batch input queue.

SYSTEMS AVAILABLE	T/S MEMORY	BATCH MEMORY
3 Control Data 6600's	24K Decimal Words	80K Decimal Words
1 Control Data Cyber 174	24K Decimal Words	131K Decimal Words
2 Control Data Cyber 175's	24K Decimal Words	131K Decimal Words
1 CRAY-1	N/A	500K Decimal Words

Word Size: CDC Systems, 6 bits/character-10 characters/60 bit word.  
CRAY System, 8 bits/character-8 characters/64 bit word.

The CDC 6600's share common permanent files, the Cybers and the CRAY-1 share another set.

All systems run under APEX/SL7 operating system, making all the timesharing and batch compilers available to each machine. Commands in T/S and control cards in batch perform similar actions for compatibility.

For pricing and further information, contact your local UCS Sales Office.

\*Remote Batch Terminals supported also by any terminal/system that will emulate above mentioned type terminals.

### Special Features

Compilers that are available:

BASIC, SUPER-BASIC, FORTRAN, SUPER-FORTRAN, CDC Extended FORTRAN (FTN3.0 and FTN4.0), COBOL (Versions 3 and 4), CFT (CRAY FORTRAN with scalar and vector capability), APL.

The CRAY-1 Computer System is a large scale, general purpose digital computer that features vector as well as scalar processing at rates of 80 million floating point calculations per second; and is designed to meet the large scale problem solving requirements of the scientific world today. "3-D Analysis" and the analysis and prediction of the behavior of physical phenomena are suited well for the large memory size and fast turnaround of the CRAY-1.

Company Name : UNIVERSITY COMPUTING COMPANY

Headquarter Address : 1930 HI Line Drive, Dallas, TX 75207

Hours Available : 24 hours per day, 6 days per week  
Toll-Free Access Areas : Dial-up access in major U.S. cities, plus national IN-WATS  
Toll-Free Hot Line : No  
Approximate number of current users : 100  
Remote Batch Terminals Supported : IBM 2770, 2780, 3780, 2922, HASP Multileave  
Line Speeds Supported : 300, 2000, 4800, 9600 Baud  
Headquarters contact : M. E. Smith, Product Manager Telephone No.: (214) 655-8879

## System Configuration & Pricing Information

### MAINFRAME

370-158-3

4 Megabyte Core

### PERIPHERALS

(16) 3330 1 and 11 Disc Drives

(12) 3420 Tape Drives

270X Type Teleprocessing Controller

### OPERATING SYSTEM

MVS/JES2

Run primarily OS but have DOS/OS Operations Capability

### PRICING

Information available from local representative or from M. E. Smith, Product Manager.

## Special Features



Company Name : UNIVERSITY COMPUTING COMPANY

Headquarter Address : 1930 HI Line Drive, Dallas, TX 75207

Hours Available : 24 hours per day; 6 days per week  
Toll-Free Access Areas : Dial-up access in major U.S. cities  
Toll-Free Hot Line : No  
Approximate number of current users : 300  
Remote Batch Terminals Supported : HASP, 2780/3780, 200 UT, COPE  
Line Speeds Supported : Up to 9600 Baud  
Headquarters contact : Doug Parker, Product Manager

Telephone No.: (214) 655-8885

### System Configuration & Pricing Information

#### MAINFRAMES

CDC CYBER 175, 262k Central Memory  
CDC 6600, 131k Central Memory

#### OPERATING SYSTEM NOS/BE

#### PERIPHERALS

Seven and Nine track tape capability

#### PRICING

Information available from local representative.

### Special Features

Dual configuration with shared permanent files.



Company Name : **UNIVERSITY COMPUTING COMPANY**

Headquarter Address : **1930 HI Line Drive, Dallas, TX 75207**

Hours Available : **24 hours/day, 6 days/week - 18 hours on Sunday**  
Toll-Free Access Areas : **Dial-up access in major U.S. cities, plus national IN-WATS**  
Toll-Free Hot Line  
Approximate number of current users : **Over 1,000**  
Remote Batch Terminals Supported : **1**  
Line Speeds Supported : **300, 2000, 4800, 9600 Baud**  
Headquarters contact : **Harry B. George, Product Manager**

Telephone No.: **(214) 655-8637**

### **System Configuration & Pricing Information**

#### **MAINFRAMES**

**Univac 1108 (4)  
131k Central Memory**

#### **OPERATING SYSTEM**

**UCC EXEC (extensively enhanced EXEC 2)**

#### **PERIPHERALS**

**7 and 9 track tapes, disk and drum storage**

#### **PRICING**

**Information available from Local Representative**

<sup>1</sup> Data 100, Cincinnati Milacron, Mohawk, Univac, Harris, Datapoint, Sycor, Data General, IBM 2780, HASP, 1004, COPE.

### **Special Features**

- **Coupled mainframes with shared files**
- **Extensive security features**
- **Switch interface allows communications to UNIVAC 1100/OS and CDC mainframes from the UCC EXEC 1108's and the FASBAC keyboard system.**



**APPLICATIONS  
DIRECTORY**

## REMOTE BATCH SERVICES

XXX.483

Company Name : UNIVERSITY COMPUTING COMPANY

Headquarter Address : 1930 HI Line Drive, Dallas, TX 75207

Hours Available : 23 hours/day, 6 days/week-18 hours Sunday

Toll-Free Access Areas : Dial-up access in major U.S. cities plus national IN-WATS

Toll-Free Hot Line :

Approximate number of current users : 100

Remote Batch Terminals Supported : 1

Line Speeds Supported : 300, 2000, 4800, 9600 Baud

Headquarters contact : Harry B. George, Product Manager

Telephone No.: (214) 655-8637

### System Configuration & Pricing Information

#### MAINFRAMES

Univac 1108 (2)  
262k Central Memory

#### OPERATING SYSTEM

Univac 1100/OS

#### PERIPHERALS

7 and 9 track tapes, 8433 disks

#### PRICING

Information available from Local Representative.

<sup>1</sup> Data 100, Cincinnati Milacron, Mohawk, Univac, Harris, Datapoint, Sycor, Data General, IBM 2780, HASP, 1004, COPE

### Special Features

Date: January, 1979

Submitted By: Harry B. George, Product Manager



REMOTE BATCH SERVICES

<b>ADP Network Services, Inc.*</b> .....	XXX.020
<b>Avco Computer Services</b> .....	XXX.040
<b>CallData Systems, Inc.</b> .....	XXX.080 - XXX.081
Computel Systems Ltd. ....	XXX.120 - XXX.121
Computer Sharing Services, Inc. ....	XXX.160
<b>Honeywell, Inc. - Datanetwork</b> .....	XXX.220
<b>Informatics, Inc.</b> .....	XXX.200
McDonnell Douglas Automation Company .....	XXX.240 - XXX.241
Mellonics Information Center .....	XXX.280
PRC Computer Center, Inc. ....	XXX.320
<b>Rapidata, Inc.</b> .....	XXX.360 - XXX.361
Service Bureau Company, The .....	XXX.400
<b>United Computing Systems</b> .....	XXX.440
<b>University Computing Company</b> .....	XXX.480 - XXX.483

\*Companies shown in **bold print** are Corporate Associate Members of AT&S





**Company Name** : CALldata SYSTEMS, INC.**Headquarter Address** : 20 Crossways Park North, Woodbury, NY 11797

**Hours Available** : Monday to Friday, 0700-2000; Saturday 0800-1700, Eastern time zone  
**Toll-Free Access Areas** : Continental U.S. except Mass., Boston is toll-free. Convl. access via TELENET  
**Toll-Free Hot Line** : Support is provided by district sales offices  
**Approximate number of current users** : n.a.  
**Remote Batch Terminals Supported** : UT200 or compatible; HASP workstation via TELENET to Calldata's TS\*RJE  
**Line Speeds** : 10 to 120 cps asynchronous; 2000 to 50K Baud bisynchronous  
**Headquarters contact** : Aron Prochko Telephone No.: (516) 575-6558

### System Configuration & Pricing Information

**TeleScope™** combines the computing power and precision the scientific and engineering community expects from a large scale CDC machine with the ease-of-use and interactive capabilities of a time-sharing system. Intercom permits interactive job execution, text-editing, and job submittal and review to the Batch processor with a local call from over 135 cities.

**CPU** - Dual CDC Cyber 172 NOS/BE Version 1 PSR 454  
262K main memory; 256K extended memory

**Tape** - CDC 9 track 1600/800 BPI  
CDC 7 track 800/556/200 BPI

**Disk** - CDC 844 — 233 million characters/disk

**Printer** - DataProducts 2550 — 1000 lpm

**Punch** - CDC 415

**Communications** - CDC 2550

Pricing is based upon the response requested, interactive, one hour, four hours or overnight service and resources, CPU and I/O data blocks, consumed. Terminal connect charges are assessed for communications dial-up services. Additional charges are for permanent disk storage and tape rental. The user assumes a small overhead charge for Amdahl job transfer to/from TeleScope via TIELINE.

### Special Features

- On-line job entry via Intercom
- Interactive and/or Batch job processing
- Numerous application packages and libraries; DBMS
- All major programming languages
- Complete documentation
- Optional job entry from IBM RJE via TIELINE
- Generalized graphics support
- Pre and post processors for many engineering programs
- Free technical support

**Date:** January, 1979**Submitted By:** Aron Prochko, Assistant Director of Marketing



Company Name : CALldata SYSTEM, INC.

Headquarter Address : 20 Crossways Park North, Woodbury, NY 11797

Hours Available : 24 hours/day Monday-Saturday; Sunday 1200-2400 (Eastern time zone)

Toll-Free Access Areas : Continental U.S. except Mass.; Boston is toll-free. Convl. access via TELENET

Toll-Free Hot Line : Assistance is provided by district sales offices

Approximate number of current users : n.a.

Remote Batch Terminals Supported : TTY asynchronous; IBM 2780, 3780, 360, 370, 1130, System 3, etc or lookalikes

Line Speeds Supported : 10 to 120 cps asynchronous; 2000 to 50K Baud bisynchronous

Headquarters contact : Aron Prochko Telephone No.: (516) 575-6558

### System Configuration & Pricing Information

With the Calldata TS\*RJE/Batch system, you can use either your own terminals or the facilities of the Calldata district offices to enter batch jobs on our 3-million byte Amdahl 470 OS/VS computer. Since this system operates in a multi-programming mode, it can satisfy the fast turnaround requirements of testing, debugging, and implementing large software system. The advantages for productive use of such systems are increased by the virtual storage (VS) feature that provides almost unlimited memory. Conversational RJE and text editing is provided by MENTEXT\*.

CPU - Amdahl 470V/5 OS/VS2 HASP, MENTEX  
Tape - STC 9 Track Dual Density 6250/1600 and 1600/800 BPI  
STC 7 Track Dual Density 800/556 BPI  
Disk - IBM 2314 and 3330 mod 11  
STC 8100 (3330 mod 1 compatible)  
STC 8350 (3350 compatible)  
Printer - IBM 1403NI and 3211 with HN and TN trains  
Punch - IBM 2540  
Communications - IBM 3705

Pricing is based upon the response requested: conversational, one hour, four hours or overnight priority. Connect charges are assessed for dial-up services at prime and reduced non-prime rates. Additional charges are permanent disk storage and tape rental, mounting fees and, when using a Calldata remote station card reading and punching and line printing.

\*MENTEXT is a product of Mentel, Inc.

### Special Features

- Optional on-line job entry via MENTEXT or VM/CMS Time-sharing
- Numerous application packages and libraries; all major programming languages
- Linked to Calldata's CDC TeleScope™ service
- Versatile terminal/communications support
- Conversational text-editing
- Complete documentation
- User-controlled job execution with SJP
- Data\*Lock™ software security
- JCL Job Scanner
- Free technical support



Company Name

**COMPUTEL SYSTEMS LTD**

Headquarter Address

**1200 St. Laurent Blvd., Ottawa, Ontario K1K 3B8**

Hours Available

**Mon. 0700-2400; Tues-Fri 0000-2400; Sat 0000-2000; Sun 0700-2000 \***

Toll-Free Access Areas

**Toronto, Edmonton and Victoria, Synchronous toll-free access**

Toll-Free Hot Line

**Yes, Toronto and Montreal**

Approximate number of current users

**65**

Remote Batch Terminals  
Supported

**Any terminal that exactly emulates a 360 model 20: 2780; 3780; 3741**

Line Speeds  
Supported

**2000 bps to 50K bps (Batch); 124 bps to 9600 bps (Interactive)**

Headquarters contact

**Mr. G. Gow, V.P. - Marketing & Sales**

Telephone No.:

**(613) 746-4353**

### **System Configuration & Pricing Information**

#### **IBM MVS/JES3 COMPLEX**

**Two IBM 370/168 - 6 MB processor storage each**

**One IBM 3033 - 8 MB processor storage**

**One IBM 3851/A2 Mass Storage System - 102 billion bytes**

**102 Disk drives (3350, 3330-I, 3330-II, 2314)**

**41 Tape drives (7 and 9 track, 200 - 6250 bpi)**

**5 Line printers (1,100 and 2,000 lpm)**

**On-site card reading and punching**

#### **OPERATING SYSTEM**

**MVS 3.7 with JES3 Version 18 (see Special Features below)**

**Pricing information available on request, based on resource billing.**

**\*(All days except December 25)**

### **Special Features**

**IBM 3850 - Low cost, high volume storage appropriate for many current batch applications. Improved information availability.**

**RACF - State-of-the-art software security.**

**NETWORK - An intelligent communications network, supported by Computel's Network Control Centre offering nation-wide access to the Ottawa complex. Cost-effective communications, centrally managed with built-in monitoring and diagnostic capability.**

**MVS/JES3 - Current IBM operating system with features such as Single System Image; Dependant Job Control; advanced recovery and diagnostic capabilities.**

Date: **January, 1979**

Submitted By: **R. McCallum, Project Manager, Advertising & Public Relations**



Company Name : COMPUTEL SYSTEMS LTD

Headquarter Address : 1200 St. Laurent Blvd., Ottawa, Ontario K1K 3B8

Hours Available : Mon, Thurs, Fri: 0000-2400; Tues: 0000-2200; Wed: 0400-2400; Sat&Sun: 0800-1700

Toll-Free Access Areas : Toronto, Edmonton and Victoria synchronous toll-free access

Toll-Free Hot Line : Yes, Toronto and Montreal

Approximate number of current users : 50

Remote Batch Terminals Supported : \*\*

Line Speeds Supported : 2000 bps to 50K bps (batch); 124 bps to 9600 bps (interactive)

Headquarters contact : Mr. A. Muir, Mgr. - Univac Dev. Support Telephone No.: (613) 746-4353

### System Configuration & Pricing Information

UNIVAC 1108 with 262K words (36-bit) modular memory, cycle time 750 nsec.

3 x 432 drums

1 x 1782 Drum

10 x 8440 Disc drives - 1.4 billion on-line characters

8 x 9 Track tape drives

5 x 7 Track tape drives

2 x CHI communication processors

On-site printing/card reading/punching

Software level 33R2 of O/S 1100 supporting Batch, Remote Batch, Time-sharing and Real-Time services.

Pricing information available on request, based on resource billing.

\*(All days except December 25)

\*\*Any terminal that emulates a UNIVAC 1004; DCT2000; NTR; IBM 2780; HAST Model 20.

### Special Features

**NETWORK** - An intelligent communications network, supported by Computel's Network Control Centre offering nation-wide access to the Ottawa complex, Cost-effective communications, centrally managed with built-in monitoring and diagnostic capability.

**DEMAND** - Control language in DEMAND is identical to BATCH therefore all BATCH work can be processed in the DEMAND mode with no changes. Special interactive compilers do in-line editing. APL is available.

Company Name : **COMPUTER SHARING SERVICES, INC.**

Headquarter Address : **2498 West Second Avenue, Denver, CO 80223**

Hours Available : **3:00 AM-12:00 midnight M-F; 3:00 AM-6:00 PM Sat; 10:00 AM-12:00 mid Sun.**  
Toll-Free Access Areas : **United States, Canada, Mexico, some European and Asian countries**  
Toll-Free Hot Line : **No**  
Approximate number of current users : **n.a.**  
Remote Batch Terminals Supported : **1**  
Line Speeds Supported : **2**  
Headquarters contact : **Dan Walkovitz** Telephone No.: **(303) 934-2381**

## System Configuration & Pricing Information

- **CSS Background Mode (remote batch service) runs on a Honeywell dual 66/27 system.**
- **Dartmouth Time Sharing System is the operating software.**
- **There are three priorities for Background Processing, and they are priced accordingly.**  
**Immediate Priority, \$0.18 per Computer Resource Unit (CRU)**  
**Delayed Priority, \$0.08 per CRU**  
**Overnight Priority, \$0.03 per CRU**  
  
**Other pricing options are also available.**
- **All programs, files, and language processors are the same for both Foreground and Background.**
- **Most of the tasks you can do interactively can also be performed in Background.**  
**Run programs**  
**Print files**  
**Use magnetic tapes**  
**Dump output to high-speed printer**

<sup>1</sup> All common asynchronous terminals; 3270-type synchronous terminals for high-speed remote job entry.

<sup>2</sup> 110, 124.5, 150, 300, and 1200 baud asynchronous; 4800 and 2000 baud synchronous.

## Special Features

- **Background mode is ideal for long-running programs.**
- **Higher memory limits are available in Background.**





Company Name : INFORMATICS, INC.

Headquarter Address : 6 Kingsbridge Road, Fairfield, NJ 07006

Hours Available : 7 days a week, 24 hours per day  
Toll-Free Access Areas : New York City, Northern New Jersey, Washington DC, San Francisco, Los Angeles  
Toll-Free Hot Line : Yes  
Approximate number of current users : n.a.  
Remote Batch Terminals Supported : Any terminal capable of emulating an IBM 2780, 3780, or 360 Hasp Workstation  
Line Speeds Supported : 2000, 2400, 4800  
Headquarters contact : David Aach Telephone No.: (201) 575-2800

### System Configuration & Pricing Information

MAINFRAMES - IBM 370/158 III-4096K, ITTEL AS/5 III - 3072K

OPERATING SYSTEM - OS/VS2 Release 1.6; HASP III

PERIPHERALS - 9 Track - 800, 1600, 6250 BPI Tape Drives 3330 and 3350 DASD; 1403 and 3211 Printers; Card Readers and Card Punch

PRICING (Partial list shown, contact company for further details)

RESOURCE	CHARGE
Computer resource (IRU)	\$0.10
Tape Mount	\$2.00
Customer Reserved disk space - Cylinders (1-5)	\$35.00 each
Unit Record Accesses (per 1000)	\$1.00
Cards Read	\$3.00
Cards Punched	\$3.00
Lines Printed - One-part paper	\$1.00
Initiation of service	\$100.00
Minimum IRU charge per job	\$1.00

The IRU is a combination of resources used including core used, scheduling priority requested, CPU time, and EXCP's accumulated.

### Special Features

Discounts are available for users selecting overnight (20% Discount) or weekend (30% Discount) job scheduling.

MODEL 204 is an on-line DBMS which can be accessed via low speed lines available in the 70 major U.S. cities.

All batch services can also be utilized via low speed terminals using the time-sharing system. Jobs can be submitted, controlled and routed back to users logged onto the Informatics Conversational Monitor System.

Languages Supported: FORTRAN G and H. WATFIV; COBOL ANS2, ANS4, VS COBOL; PLI OPTIMIZER, PLI/F; VS ASSEMBLER, ASSEMBLER H; RPG E; GPSS V.

Additional Features: CICS; IMS/VS DB 1.0.1; PREMIS; BMDP; CSMP; MARK IV; RECON; SAS; MODEL 204; RAMIS II; ACCOUNTING IV; SPSS; SYNCSORT.

Company Name : **HONEYWELL DATANETWORK**

Headquarter Address : **Honeywell Plaza, MN12-1124, Minneapolis, MN 55408**

Hours Available : **24 Hours/Day, 7 Days/Week**

Toll-Free Access Areas : **Nationwide Toll-Free Access (Excluding Alaska & Hawaii)**

Toll-Free Hot Line : **No**

Approximate number of current users : **n.a.**

Remote Batch Terminals Supported : **1**

Line Speeds Supported : **2000 through 4800 baud dialup, 9600 baud dedicated service.**

Headquarters contact : **Marketing Support** Telephone No.: **(612) 870-6000**

## System Configuration & Pricing Information

**DATANETWORK Services Remote Computing Center** is based upon multi-system Honeywell central processors. Each of the systems consist of large-scale multi-processor Level 66 or Series 6000 computers configured with multiple front-end network processors.

- **Storage Features:** Seven and Nine track tape drives, random access disk drives, bulk store, Cache memory.
- **Output Features:** High speed line printers, 12,000 LPM page printers, computer output microfiche.
- **Operating System:** Honeywell Information Systems GCOS Operating System is used to control both remote batch and time sharing with the appropriate queuing, file management and resource scheduling.
- **Pricing-Line Charges:** No connect charge for remote batch service.
  - Storage:** Per block (1280 ASCII bytes or 1920 BCD Characters) used per month with volume Incentives.
  - Discounts:** Non-prime time discount of 25%. Both volume usage and guaranteed monthly revenue plans can offer as much as 30% off list price. For further pricing information, call the DATANETWORK Marketing Support number noted above.

<sup>1</sup>Honeywell Level 6, Series 700, Series 200/2000, 2780, Datapoint, Sycor, Mohawk, Data 100 and others.

## Special Features

Certain reseller situations may also be subject to additional discount agreements. Contact the above DATA-NETWORK Marketing Support telephone number for further information.

An extensive library of Honeywell Information Systems applications software in addition to acquired software, is available to DATANETWORK users.

The Honeywell GCOS Operating System allows files to be created or accessed interchangeably in either time sharing or remote batch.



Company Name : MCAUTO (McDonnell Douglas Automation Company)

Headquarter Address : P.O. Box 516, St. Louis, MO 63166

Hours Available : 6:00 a.m. - 1:00 a.m. M thru F; 6:00 a.m. - 8:00 p.m. Sat. Central Time

Toll-Free Access Areas : Continental United States (excluding Alaska)

Toll-Free Hot Line : No

Approximate number of current users : 500

Remote Batch Terminals Supported : 200 UT or devices that emulate the 200 UT; HASP Workstation terminals

Line Speeds Supported : 2000 and 4800 bps

Headquarters contact : L. R. Buschman

Telephone No.: (314) 232-4640

## System Configuration & Pricing Information

The MCAUTO CYBER Service consists of three Control Data Corporation (CDC) CYBER 175 computing systems located in St. Louis, Missouri. The systems run under NOS 1.1 (NOS. 1.3 approximately February 1979) with many modifications by MCAUTO to reflect our own remote computer services philosophy.

The Network Operating System allows the 175's to be used in a multi-mainframe environment in which Extended Core Storage (2 million words) and all production disc files (10 billion 6-bit characters) are shared among the three systems. This is a positive benefit for MCAUTO clients in several ways: 1) reliability of the network is improved because the user can access his files from any mainframe, 2) turnaround times are good because batch jobs can be submitted on one system and executed on another if necessary, 3) timesharing and batch work is completely integrated without physically moving files between systems.

Charges for the remote batch service are accumulated in three primary areas - Connect Time, On-line Storage, and Main Resource Units. The Main Resource Unit (MRU), which essentially measures central processor resources required by a job, is divided into five service levels called EXPRESS, STANDARD, ECONOMY, DEFERRED, and WEEKEND. Each service level has a turnaround time associated with it and carries a different price per MRU. The user has the option to select any level that is appropriate for his present needs.

Specific unit rates are available by contacting your nearest MCAUTO Marketing Office.

## Special Features

MCAUTO also offers the 370 Service based upon IBM hardware. The CYBER Service and the 370 Service communicate with each other through a link devised and implemented by MCAUTO.

Through this link MCAUTO clients have access to either service and its unique advantages. For example, applications that reside only on the 370 Service are yet executable through the CYBER Service; remote batch terminals normally associated with IBM hardware can be used indirectly to access the CYBER Service. MCAUTO offers the best of both hardware types to our users.



Company Name	: MCAUTO (McDonnell Douglas Automation Company)
Headquarter Address	: P.O. Box 516, St. Louis, MO 63166
Hours Available	: 8:00 a.m. - 12:00 p.m. Monday thru Saturday (Central Time)
Toll-Free Access Areas	: Continental United States (excluding Alaska)
Toll-Free Hot Line	: No
Approximate number of current users	: 1380
Remote Batch Terminals Supported	: IBM Computers, IBM Terminals, other computer/terminals which emulate IBM
Line Speeds Supported	: 2000, 2400, 3600, 4800, 7200, 9600, 50KB
Headquarters contact	: G. L. Henderson
Telephone No.:	(314) 232-6963

### System Configuration & Pricing Information

The MCAUTO IBM 370 service currently consists of three 3033's, one 3032 and six 168's in the St. Louis, Missouri complex, plus three 3033's and three 168's in the Long Beach, California complex. Both centers operate in a multi-mainframe environment under JES/3 with MVS release 3.7. MCAUTO consistently achieves 99% availability. 90% of jobs which require set up are completed in less than one hour, and 98% of jobs which require no set up are completed in less than 30 minutes. MCAUTO's commitment to serving client needs includes a total communications network and a stable processing environment.

Pricing available upon request.

### Special Features

MCAUTO also offers CYBER service based upon Control Data Corporation (CDC) hardware. The IBM 370 service and the CYBER service communicate with each other through a link devised and implemented by MCAUTO. Through this link MCAUTO clients have access to either service. For example, remote batch terminals normally associated with IBM hardware can be used indirectly to access the CYBER service. MCAUTO offers the best of both hardware types to our users.



## REMOTE BATCH SERVICES

XXX.280

Company Name : MELLONICS INFORMATION CENTER, Litton Systems, Inc.

Headquarter Address : 6701 Variel Avenue, Canoga Park, CA 91303

Hours Available : --  
Toll-Free Access Areas : Toll free access available from over 80 cities in U.S.  
Toll-Free Hot Line : No  
Approximate number of current users : --  
Remote Batch Terminals Supported : IBM 2770, 2780, 3780, 1130, Model 20, 360, System 3. \*  
Line Speeds Supported : 2,000, 4800 dial-up  
Headquarters contact : John L. Cudworth Telephone No.: (213) 887-5100

### System Configuration & Pricing Information

#### I/O DEVICES

Two IBM 370/3033's 8 and 6 megabyte — 40 tape drives — 104 disk drives — Printers: (1) 3211, (2) 3800's, (1) 1403N1 — Card readers: (2) 3505's, (2) 2501's — Card Punch: (1) 3525 — Paper tape reader: (1) 2671 — Paper tape punches: (2) 1018's — Teleprocessing controllers: (3) 3705 — Drum Storage Units: (2) 2305 — Datagraphix Com recorder.

#### BATCH WORK

Operating Systems - O/S MVS, JES2, UCC Two (DUO) DOS Simulator  
Job Classes - Priority, Express, Regular, Scheduled production, Deferred  
Programming Languages - FORTRAN IV, PL/I, Assembler, COBOL, RPG, DL/I, GIS/VS  
Utilities - DYL-250, DYL-260, FDR, PANVALET, CALCOMP, SSPLIB, CPO, DATAGRAPHIX, SORT, Standard IBM O/S utilities.

#### Pricing Information

Contact Mellonics Information Center

\*Other non-IBM equivalents such as Data-100, HARRIS.

### Special Features

IMS/DC, GPSS, PMS IV, CSMP, ECAP, CFMS, APT, SPSS, FORESIGHT, TOTAL BIOMED, RAMIS, TSO

Application packages under TSO - MIS, FORESIGHT, RAMIS

ATMS - Microfiche Services

TERMINALS SUPPORTED - 2741 equiv., ASCII, 327X equiv.

Date: January, 1979

Submitted By: John L. Cudworth





Company Name : **PRC COMPUTER CENTER, INC.**

Headquarter Address : **7670 Old Springhouse Road, McLean, VA 22102**

Hours Available : **Twenty-four hours-seven days per week and all holidays.**

Toll-Free Access Areas : **Information available upon request.**

Toll-Free Hot Line : **No**

Approximate number of current users : **Over 150**

Remote Batch Terminals Supported : **IBM 2780, 3780, HASP, RJE Work Stations or Compatible terminals.**

Line Speeds Supported : **2400, 4800, and 9600 Baud**

Headquarters contact : **George A. Thompson, Jr., V.P.**

Telephone No.: **(703) 893-4800**

### System Configuration & Pricing Information

#### HARDWARE

- 1 - Itel AS/5-I (3 megabytes of memory). The Itel AS/5 is a plug compatible replacement for the IBM 370/158.
- 1 - Itel AS/5-III (4 megabytes of memory).
- 16 - Tape Drives (7 Track, 9 Track - 800, 1600 and 6250 BPI)
- 6 billion bytes of on-line direct access storage (2314, 3330-I, 3330-II and 3350)
- 2 - Programmable Communications Control Units
- 2 - 2250 LPM Line Printers
- 2 - 1100 LPM Line Printers
- 2 - 1000 LPM and 300 CPM Reader/Punch Units

#### OPERATING SYSTEM

- OS/VS2 MVS
- JES2 Shared Spool with Remote Job Entry (RJE)
- TSO
- WYLBUR under TSO

#### PRICING

Available upon request

### Special Features

- Dual CPU loosely-coupled multiprocessing configuration via JES2 multi-access spool for on-line/remote job entry backup.
- Dual front-end processor configuration for communication system backup.
- Complete sharability of user DASD volumes for extended device accessibility.
- Easy access to batch processing from TSO and WYLBUR for job submission and output retrieval.
- Full output routing capabilities for RJE stations.
- Multiple output class and form structures for output processing flexibility.
- Full access security for batch and on-line users via TSO and ID, account/subaccount and password validation.
- Daily user disk volume backup facilities for batch and on-line systems.



Company Name : RAPIDATA, INC.  
Headquarter Address : 20 New Dutch Lane, Fairfield, NJ 07006

Hours Available : Weekdays: 04:00 - 23:00; Sat. up 04:00 until Sun. down 23:00  
Toll-Free Access Areas : United States, Canada, Hawaii and London, U.K.  
Toll-Free Hot Line : Available only at local offices  
Approximate number of current users : Over 500  
Remote Batch Terminals Supported : IBM 2780 (BISYNCHRONOUS Transmission)  
Line Speeds Supported : 2000, 4800 Baud  
Headquarters contact : Dorothy Monopoll Telephone No.: (201) 227-0035

### System Configuration & Pricing Information

#### HONEYWELL SYSTEMS

5 dual processor Honeywell 437's with main memory of 98K bytes. Twenty-four bit word size. GTE-1000 front ends. Honeywell DSS drives provide more than 2,214 million characters of storage.

#### PRICING

Connect Time	Prime Time	Non-Prime	
2000 Baud	\$30/hr.	\$30/hr.	
4800 Baud	\$30/hr.	\$30/hr.	
CPU Units	Prime Time	Non-Prime	Weekends
Foreground	\$.07	\$.07	\$.07
Background	\$.07	\$.042	\$.024

#### STORAGE

On-Line - \$.60 per unit per month first 50 units per file.  
\$.20 per unit all units above 50 units per file.

\*Unit = 1000 characters or any part thereof.

### Special Features

#### HONEYWELL

- Bulk storage discounts are available upon request from Rapidata by execution of a storage rider.
- Deferred processing is available to enable the user to save terminal connect time costs and to take advantage of non-prime time CPU discounts.
- Rapidlink is available to link the user's in-house IBM 360 or 370 to the appropriate Rapidata system.
- Off-line storage is provided at \$5.00/file/month.

Company Name : **RAPIDATA, INC.**Headquarter Address : **20 New Dutch Lane, Fairfield, NJ 07006**

Hours Available : **Weekdays 24 hrs., Sat. down 24:00, Sun. up 07:00, down 20:00**  
Toll-Free Access Areas : **United States, Canada, Hawaii and London, U.K.**  
Toll-Free Hot Line : **Available only at local offices**  
Approximate number of current users : **Over 500**  
Remote Batch Terminals Supported : **IBM 2780 (BISYNCHRONOUS)**  
Line Speeds Supported : **2000, 4800 Baud**  
Headquarters contact : **Dorothy Monopoli** Telephone No.: **(201) 227-0035**

**System Configuration & Pricing Information****RAPIDTEN SYSTEMS**

2 DEC 1070's, memory size of 1,311K bytes, 1 DEC 1080 memory size of 1,311K bytes, each with GTE 1000 front end. ITEL and Digital disks provide an excess of 1,740 million characters of storage.

**PRICING**

Connect Time 2000, 4800 Baud	Prime Time \$30/hr.	Non-Prime Time \$30/hr.	
CPU Units	Prime	Weeknights	Weekends
Foreground	.07	.07	.07
Background (Off-Line)	.07	.042	.024
Instant Batch (High priority batch)	.08	.049	.028
RAPIDTEN Option (Foreground)	.07	.042	.024

**STORAGE****On-Line**

\$ .60 per unit per month for the first 50 units per file.

\$ .20 per unit per month for all units above 50 units per file.

\$ .10 per unit per month for all data storage units above 50 units per file.

**Special Features**

- Bulk storage discounts are available upon request from Rapidata by execution of a storage rider.
- Background-10 deferred processing is available to enable the user to save terminal connect time and to take advantage of non-prime time CPU discounts.
- Mountable storage, private customer disk pack rental, is available for large volumes of data.
- Rapidlink is available to link the user's in-house IBM 360 or 370 to the appropriate Rapidata system.
- Discounted off-line Archive storage rates for files accessed infrequently are available.

Company Name : **THE SERVICE BUREAU COMPANY**

Headquarter Address : **500 West Putnam Avenue, Greenwich, CT 06830**

Hours Available : **8 AM - 11 PM Eastern Time, Mon. - Fri., and for 12 hrs. on Sat. and Sun.**  
Toll-Free Access Areas : **Over 100 cities nationally and internationally**  
Toll-Free Hot Line : **Yes**  
Approximate number of current users : **n.a.**  
Remote Batch Terminals Supported : **Most terminals capable of emulating JES communications protocol (3270 support)**  
Line Speeds Supported : **10,15,30 and 120 CPS for interactive users, 2000,2400,4800,7200,9600 Baud for RJE**  
Headquarters contact : **W. H. Warner** Telephone No.: **(203) 622-2044**

## System Configuration & Pricing Information

**CALL/PLUS** places the processing power of a scheduled batch processing computer in the hands of the data processing professional. **CALL/PLUS** offers a conventional, familiar set of tools and supplies batch processing resources that are similar to, and compatible with the resources of the customer's own data processing system.

### SYSTEMS SOFTWARE

- IBM Operating System OS/VS2, Release 3.7, Multiple Virtual Systems (MVS)
- Job Entry Subsystem 2 (JES2), Release 4
- OS/VS2 TSO, Time-Sharing Option, including SBC and IBM enhancements
- Standard access methods
- Language translators: ASSEMBLER; FORTRAN; VS BASIC; PL/I; COBOL; VS APL
- Source Library Management System - Panvalet
- Structured Programming Facility (SPF)

### PRICING

Pricing falls into three (3) major areas listed below. The charges shown are only for the one class of service using a 120 CPS terminal and interactive TSO. Other differently priced services are available as listed on SBC's Standard Price Schedule. One and two year volume discounts are also available.

#### CALL/PLUS Connect Time Charges

Interactive Terminal Speed	Prime Time	Off-Hours
120 CPS	\$16.00 per hour	\$6.40 per hour
	plus \$.075/KCB	plus \$.03/KCB

#### CALL/PLUS Process Unit Charges

Interactive TSO	\$ .100/Process Unit	Class 8 \$.036/Process Unit
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#### CALL/PLUS On-Line Storage Charges

3330 On-Line Disk	\$.08 per track/day
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## Special Features

The development and processing of applications through a remote computing service requires an extensive set of programmer and end-user oriented tools. Through the remote batch and time-sharing facilities of **CALL/PLUS**, these tool are made available in the form of programming languages, related support facilities and data base management software. This data base software is geared to the reporting requirements of application end-users, as well as the system design and installation needs of data processing professionals. The **CALL/PLUS** and **CALL/370** (SBC's Management Timesharing Service) Applications Libraries provide data processing professionals and management end-users with some of the best Application Systems in the data processing industry today.



Company Name : **UNITED COMPUTING SYSTEMS**

Headquarter Address : **2525 Washington, Kansas City, MO 64108**

Hours Available : **5 am-2 am Weekdays, 6 am-midnight Saturday, 8 am-8 pm Sunday**

Toll-Free Access Areas : **Continental United States and London, England**

Toll-Free Hot Line : **No**

Approximate number of current users : **3000**

Remote Batch Terminals Supported : **CDC 200 UT, IBM 2780 or 3780 type terminals \***

Line Speeds Supported : **2000, 2400, 3600, 4800, 9600, 19.2K Band.**

Headquarters contact : **Larry E. Everitt, Product Manager** Telephone No.: **(816) 221-9700**

### System Configuration & Pricing Information

APEX/SL7 service for remote batch access is provided thru inward wats lines for the United States & Canada, and special lines for London, England. Leased communications direct lines are available in addition to the wats lines. The timesharing access communications system "UNINET" provides timesharing access from over 105 cities, and has remote job entry (RJE), and remote batch entry (RBE) for submitting a file of control cards to the batch input queue.

**SYSTEMS AVAILABLE**

3 Control Data 6600's  
1 Control Data Cyber 174  
2 Control Data Cyber 175's  
1 CRAY-1

**T/S MEMORY**

24K Decimal Words  
24K Decimal Words  
24K Decimal Words  
N/A

**BATCH MEMORY**

80K Decimal Words  
131K Decimal Words  
131K Decimal Words  
500K Decimal Words

Word Size: CDC Systems, 6 bits/character-10 characters/60 bit word.  
CRAY System, 8 bits/character-8 characters/64 bit word.

The CDC 6600's share common permanent files, the Cybers and the CRAY-1 share another set.

All systems run under APEX/SL7 operating system, making all the timesharing and batch compilers available to each machine. Commands in T/S and control cards in batch perform similar actions for compatability.

For pricing and further information, contact your local UCS Sales Office.

\*Remote Batch Terminals supported also by any terminal/system that will emulate above mentioned type terminals.

### Special Features

Compilers that are available:

BASIC, SUPER-BASIC, FORTRAN, SUPER-FORTRAN, CDC Extended FORTRAN (FTN3.0 and FTN4.0), COBOL (Versions 3 and 4), CFT (CRAY FORTRAN with scalar and vector capability), APL.

The CRAY-1 Computer System is a large scale, general purpose digital computer that features vector as well as scalar processing at rates of 80 million floating point calculations per second; and is designed to meet the large scale problem solving requirements of the scientific world today. "3-D Analysis" and the analysis and prediction of the behavior of physical phenomena are suited well for the large memory size and fast turnaround of the CRAY-1.